THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

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WHO MAKES THE BEST GAS-METER?

In answering this question, it is hardly necessary to advert to the old established house of Mr. Samuel Down—now Down & Merrifield—of this city. Mr. Down's reputation as a gas-meter manufacturer is almost coeval with the gas business here, and his excellent meters are to be found throughout the country.

Mr. Down was among the first—if not the very first—when this JOURNAL was started, to encourage and sustain it, and he did it liberally. It would, therefore, be ungrateful, indeed, if an opportunity should ever be allowed to pass without recognizing the obligation—although, in a wordly point of view, he hardly needs our aid, so abundant has been the reward of his own industry, enterprise, and integrity.

FATAL GAS EXPLOSIONS IN ENGLAND.

At Fenton, Staffordshire, an explosion of gas recently took place at the Cock Inn, which caused the loss of three lives. The landlord and landlady having gone from home for a short time, left the house in charge of a person named Leach, a neighbor, who, on the afternoon of the explosion, went into the kitchen to prepare tea, accompanied by her daughter. As she entered the room a terrible explosion of gas took place. The landlord's daughter, who had a child in her arms, was knocked down by the kitchen door, and the child was so severely injured, that it died on the following morning. Both Mrs. Leach and her daughter were frightfully burned, and expired soon after having been removed to the North Staffordshire Infirmary. An inquest was held on the bodies, and a verdict of accidental death was returned.

Another fatal explosion took place in January at the East Cowes Gas-Works, by which Mr. G. S. Billows, the manager of the works, and a boy named Travers Strickland, 7 years old, were killed, by the explosion of a gas-meter. From the evidence of Mr. Charles Watts, we learn that he was out walking with two of Mr. Strickland's sons, and stopped in at the gas-works. Mr. Billows was in the meter-house with another man, who was holding a lighted candle, explaining to him some defect in a small brass pinion, and the light was held to it to enable Mr. Billows to take the dimensions of the wheel, when the meter exploded with terrific violence, and the fragments of iron plate, flying in every direction, struck the two deceased, tearing away the front of their skulls. At the time of the explosion, Mr. Watts was holding the boy by the hand. The man holding the candle received some dreadful injuries about the head. Mr. Watts escaped with a deep cut on the cheek, a wound on the lips, and the loss of four teeth. Mr. Strickland's other son, 8 years old, received a deep gash in the neck and other injuries, which will not, however, prove fatal. Mr. Paddon, civil engineer, said he examined the meter which was used for the purpose of measuring the gas made at the works, and he found that at the time of the explosion the meter was "at rest." An explosive mixture of gas and air remained in the meter, which caused the catastrophe. The verdict of the coroner's jury was "accidental death."

Some gas-engineers and superintendents are careless about this matter of approaching meters and other apparatus with a light. These accidents should serve as a warning to such, and should impress the fact upon all, that great care is necessary to be observed always, and that no light should be taken anywhere in the vicinity of pipes, mains, meters, or any other apparatus, where leakage is even suspected.

PETROLEUM ITEMS.

CONVEYING PETROLEUM IN PIPES.—An exchange says: The project for conveying oil by means of pipes, laid under ground from one point to another, is now being practically tested upon the Tarr farm. A 2-inch pipe is now being laid from Tarville, to Plumer, Pa., a distance of about two miles and a half in a straight line. It is proposed to force the oil through this pipe by means of powerful steam-engines. The parties concerned are sanguine of success. We understand that Barrows & Co., for some time past, have been conveying their oil from the burning well to their refinery, a distance of from 800 to 1,000 feet, and the plan works admirably.

PETROLEUM FOR HARBOR DEFENSE.—A late number of the *Scientific American* contains a letter from a correspondent in Wales, suggesting some novel ideas in regard to the use of petroleum for harbor defence. We quote:

"I herewith give you an idea which may or may not be practicable; of this I leave you to judge. Supposing the entrance into a harbor to be narrow, and a good fort or other stronghold to be in the neighborhood, with a convenient place for a steam-engine; from this lay down pipes of from three to six inches in diameter, directly across the channel where the vessels have to pass; the pipes are provided with several valves, so that no water can enter them. When required, fill the pipes with native distilled *coal-oil* or other hydro-carbon liquids; then apply a force-pump at the end nearest to the fort and force through the pipes a continued stream of oil, which, by the pressure, opens the valves and discharges the liquid oil. This oil being lighter than the water, floats to the top, and can then be set on fire, either by Congreve rockets thrown from the land or by a preparation which, together with the oil, is forced through the pipes, and would ignite when coming in contact with the air. There may be also forced through the pipes a quantity of small explosive shells, which would do some service. The ignited oil will not only set the combustible parts of the ships on fire, but will create such a dense and unpleasant smoke as to blind and suffocate officers and crews on board the vessels. I have been once in the midst of the fire and smoke of burning petroleum; and therefore I know that any one who has once experienced its horrors will never wish to be surrounded by it a second time."

The editor of the *Scientific* thus comments upon the idea of its correspondent:

"We publish, on another page, a communication all the way from North Wales, in which the writer suggests a mode of harbor defense which is at once novel and extraordinary. He proposes that petroleum oil, with the aid of rockets, be used to set fire to the enemy's fleet. Let us inquire into this scheme and see how far it can be successfully employed. Of the article of petroleum we have an abundant supply, but how shall we collect and store it in quantities sufficient to meet the emergency?—that is the practical question. If the famous Oil Creek in Pennsylvania could be turned this way, we could set about building a huge aqueduct to conduct it to a suitable reservoir for its receptacle, dug out off the crown of Staten Island. A sluice way could be made to the base of the island, just above Fort Richmond, and upon the signal being given of the approach of the enemy's fleet, the flood-gate could be opened, and a stream of oil could be poured down into the channel, which, when set on fire, would envelope the vessels in a perfect fire of Pandemonium. If the tide should be flowing at the time, the fleet could be allowed to pass up the Narrows, and thus the oil would create a fire in the rear, which would be bound to overtake and destroy the fleet. In order to protect the city from the devouring element, steam-fire engines could be posted along the docks, and especially at the battery, by which instrumentality the flames could be successfully fought away, should an attempt be made, in their progress, to swallow up the city. The plan here proposed would be better than the one suggested by our correspondent, as we doubt if pipes laid across the channel could be relied on as able to supply a sufficient quantity of oil for the purpose. Petroleum oil is now selling at 38 cents per gallon, and we suggest to the Government that now, if ever, is the time to gather up this destructive weapon of naval warfare."

Not yet, Mr. Editor! Wind and tide may have some very strong impediments to put in the way of such a wholesale waste of petroleum. Give us plenty of Monitors, Rams, and fifteen-inch Rodman guns, and our harbor will need nothing else but strong hearts and arms to man them.

PETROLEUM AS A STYPTIC.—Not the least wonderful of the many discoveries that have grown out of the introduction of rock oil, is the knowledge of its undoubtedly valuable curative properties. We have not hitherto noticed that its efficiency in stopping hemorrhage has been prominently brought before the public, but we have heard of a case at one of the saw-mills in town, in which it was successfully used for that purpose. One of the workmen, having had his thumb severely lacerated by a saw, bethought himself of making an application of coal-oil, and the blood, which was flowing profusely from the cut, was almost instantly staunched.—*Mt. Forest Paper.*

CONDITION OF THE CANADA OIL WELLS.—The Toronto *Globe* has the following information respecting the future supply of Canadian petroleum:

"The stoppage of several of the largest flowing wells indicated, it was feared, an exhaustion of the sources of the oil. When it was found, however, that even more than the usual response was made to the vigorous pumping operations thus induced, the suspense was succeeded by a very general feeling of relief, not only because a good supply was forthcoming, but also that a large number of persons interested in the pumping wells would reap the benefit of their investment. Indeed the 'indications' in the oil regions of Canada are every day more apparent, covering an immense area of country, and promising an abundant return for the investment of capital. In the vicinity of Oil Springs there are over 100 wells, twenty-five of which are in constant operation. The present yield of crude oil in Canada does not fall short of 300 barrels per day, which can be almost indefinitely increased."

PETROLEUM ON THE CASPIAN SEA.—It is said that a company is about to be formed in London, for the purpose of working the petroleum springs in the neighborhood of the Caspian sea.

ANOTHER FLOWING WELL.—The Oil Springs, C. W., *Chronicle* announces that on January 1st, Messrs. Campbell & Forsyth of that place obtained another flowing well. This is the third well owned by the firm, and another is being sunk. They open the new year under favorable auspices.

The same journal has less favorable news for other parties. It says: The Shaw and Wilson wells are fast draining the other wells in the immediate vicinity, but the rumor that the Shaw well had failed entirely is set aside. It is now running, and has been for three days.

WHERE ARE THE GAS COMPANIES' REPORTS?

By a law of this State, every Gas Company is required to present a report of its affairs annually to the Comptroller, under a penalty of two hundred and fifty dollars for neglecting to do so.

In a communication to the Legislature, the Comptroller informs that body that the companies have not reported, and that no action has been commenced against them for the penalty, because his department has no official evidence of the existence of such companies.

It is probable that the four mammoth New York companies would rather put up the one thousand dollars penalty than comply strictly with the law.

REPORTS OF GAS-LIGHT COMPANIES.

PHILADELPHIA, PA.

TRUSTEES' REPORT.

To the Select and Common Councils of the City of Philadelphia:

In conformity with the Ordinances "for the construction and management of the Philadelphia Gas-Works," the Trustees present their Twenty-eighth Annual Report.

Loan No. 2, for $200,000, created on the 8th of February, 1838, matured on the first instant, and has been paid out of the sinking fund. This payment completes the redemption of the first three loans, (amounting, in all, to $475,000,) authorized to pay for the cost of the original construction and the extensions of the Gas-Works, while they were the property of the stockholders.

The amount to the credit of the sinking fund, on the first of January, 1862, was $1,220,891 87, from which was taken the sum of $150,000 to redeem Loan No. 1, maturing on that day; and the appropriations made to the fund during the year, make its amount, on the first of January, 1863, $1,182,947 37, of which there is at present the sum of $1,129,039 55 invested in city and gas loans.

The quantity of gas manufactured during the year, has been 656,957,000 cubic feet; the increase over the previous year is 24,412,400 feet.

This increase is largely owing to the increased activity in manufacturing of all kinds, and to the change in the public lamps from fluid to gas. The whole quantity made under the trust from its commencement, is 6,169,553,000 cubic feet.

The largest consumption in twenty-four hours, to this time, is 3,179,000 cubic feet.

The street mains laid during the year, have a length of 98,071 feet, making the entire length of main pipes 426¾ miles.

The whole number of public lamps under the care of the trust on the 1st inst., was 6,871—of which 6,690 are lighted with gas, and 181 with fluid—whilst 142 have been changed from fluid to gas during the year, to the manifest convenience and security of the public. The entire number of lights supplied with gas from the City Works, is 529,000, being an increase of 23,043 during the year.

The two new gas-holders in the First and Twentieth Wards have been in use during the year, with evident advantage to the consumers in the districts with which they are partially connected. Their needful connections are not yet completed; it is believed that they will relieve the gas from the irregularity of pressure formerly existing in its distribution, and remove all just ground of complaint from that cause.

The trustees deem it their duty to make special mention of a serious defalcation of one of their employees, the first in the history of the Gas-Works. The opportunity for the crime appears to have occurred from the omission of the proper monthly settlement and audit of the accounts of sales of coke and other by-products, at the Ninth Ward office. Such settlements and audit had been made regularly for nearly twenty years, and then discontinued.

The system of accounts kept, comprises four separate series, each distinct and complete in itself; two of them are under the direction of the chief engineer, and two under that of the cashier. Of the former, one embraces the records of the materials used and the products obtained in the factories, and in the construction and extension of the works; taking cognizance of quantities only, irrespective of cost or value. Its entries are made daily, and it is balanced at frequent intervals; some parts daily, others monthly, and the whole at the close of each year.

The other account in the engineering department, exhibits all disbursements of money appropriated by the board to this department, arranged under the different heads of current expenses and permanent work: it is balanced and audited twice a month, and laid before the board at each meeting, with all its details and vouchers.

Of the other two accounts, one includes all money received from sales of all kinds, at all the receiving offices and stations; the several original accounts being kept at the different offices, and balanced monthly for audit at the principal office. The other of them is the general financial account of the cashier, containing all receipts and payments in every department, and exhibiting the results of all the monetary transactions, and the condition of all the funds of the trust; it is settled and audited twice a month, and its balance reported at each meeting of the Board of Trustees.

The duties of the two chief officers, under whose directions these accounts are placed, are defined in the by-laws of the board of trustees, in the following words:

13. All the works, including their extension and repairs, the manufacture of gas, the laying of mains, and the introduction of service pipes and meters, shall be under the direction of the chief engineer, subject to the control of the board.

14. There shall be such number of assistant engineers as the board of trustees shall from time to time deem necessary, who shall receive their instructions from, and account to, the chief engineer for the discharge of their duties.

15. The chief engineer shall report at least once in each year, or oftener if required by the board of trustees, the condition of the various departments of the works under his charge. He shall examine and certify all bills and accounts, and report the same to the board of trustees for payment. He shall also, at each stated meeting, furnish the board with a detailed statement of the disbursement of the money appropriated to his use, and exhibit proper vouchers therefor, together with an estimate of the amount required for the various departments, and give security for the proper application of the funds appropriated to his use.

16. He shall attend the meetings of the board of trustees, and of the standing committee, for the purpose of advice and counsel.

17. The chief engineer shall report to the board of trustees any neglect of duty or violation of orders on the part of any officer in any department under his care, and have authority to suspend from duty any such officer, if in his judgment the interests of the works require it, until the board may take action in the case, and also to employ and discharge all persons engaged in the works who are not elected or appointed by the board of trustees.

18. The department of finance shall be under the direction of an officer, who shall be known as the cashier of the Philadelphia Gas-Works.

19. It shall be his duty, subject to the control of the trustees, to receive all moneys arising from the sale of loans, gas, or other products of the works, and of all materials of every description, and, in conjunction with the president, have the custody of all the securities belonging to the trust. He shall also give sufficient security for the faithful keeping of the funds and securities entrusted to his care, and his official bond shall be in the exclusive possession of the president.

20. All money received by him shall be deposited daily in such bank or banks as the trustees shall direct, in the name and to the credit of the trustees of the Philadelphia Gas-Works: *Provided*, he shall not be required to deposit a less sum than one hundred dollars, nor any cash received by him within an hour before the closing of the bank.

21. He shall also visit, at least monthly, and carefully inspect the accounts of the various offices in which payments are made on account of gas or other products. He shall have the supervision of the reports of the inspectors of meters, and of the inspectors of fittings. Connected with this department there shall be a clerk, who shall be known as the registrar, who shall, under his direction, keep the accounts.

22. He shall, in conjunction with the chief engineer, so arrange the finances as to meet the engagements of the trustees as they may become due and payable. He shall also submit to the board, at each stated meeting, an account of his cash receipts and payments from the date of their last meeting, examined by the standing committee; and at the first stated meeting in each month submit an estimate of the probable receipts for that month.

23. He shall have the entire supervision and direction of all the clerks and other persons employed in the department of finance, and be charged with the payment of all salaries and wages, and with the interest on loans; certify all bills or accounts authorized to be contracted by him; attend the meetings of the board of trustees and the standing committee thereof; report to the board any neglect of duty or violation of orders on the part of any person employed in his department, with power to suspend any officer or other person employed in the department of finance, if, in his judgment, it shall be necessary, until proper action shall be taken thereon by the board of trustees.

24. All payments shall be made by checks, signed by the president of the board of trustees and cashier.

25. Every clerk or other person entrusted with the receipt and disbursement of money, shall give such securities to the board of trustees as they may determine, for the faithful performance of his duties.

26. Every clerk or other person entrusted with the collection of money belonging to the Gas-Works, shall pay it over to the cashier, at the office of the Philadelphia Gas-Works, daily.

27. All persons employed by the board of trustees, except mechanics and laborers, shall be elected annually, by a vote of the majority of the trustees present at the first stated meeting of the board in March of each year, or as early thereafter as practicable; they shall continue in office until the first day of April of the year next following, or until their successors shall be elected, unless sooner dismissed from office by a vote of the majority of the whole number of the board of trustees.

It would appear from the by-laws, that the proceeds of the sale of coke, &c., were properly under the charge of the cashier, and that he should have settled the account of the defaulting clerk from time to time.

It had, however, been the *custom* of the cashier, for many years, to consider the clerk at the Ninth Ward Works as the private clerk of the engineer, and all receipts given for the product of these sales, had been given, not to the defaulting clerk personally, but to him in the name of the engineer; and the cashier seems to have fallen into the error of supposing that the clerk in question accounted to the engineer, whilst the engineer supposed that the cashier audited the account.

As soon as the deficit was discovered by the clerk recently appointed to take supervision of that department, the fact was reported to the president of the board of trustees, who directed an examination to be made of the accounts of these sales for the whole time that the audit had been omitted, and for several years previous, and also, that steps should be taken, with the aid of the detective police, to discover whether or no any trace existed, of money or property that could be made available for its re-imbursement.

This search is still in progress, and a committee of the board has been charged with the duty of examining into all the particulars of the fraud; and to extend its investigations to all the departments for the purpose of discovering whether there exists any other neglect by which the trust can be defrauded without immediate detection.

The committee has scrutinized all the accounts of the employees, and the methods of keeping them; it has discovered no other defalcations or errors, nor has it ascertained any defects in the methods prescribed by the by-laws, rules and regulations, provided the same are systematically and fully carried out.

It appears that the whole amount of the deficit is $41,584 92, which was abstracted from time to time during a period of about five years.

In this gradual defalcation, the criminal was aided by the constant improvement in the manufacture of gas in the mode pointed out by the engineer.

It is, upon the whole case, apparent that the present defalcation is due to the neglect of existing rules, which seem ample to secure the ends in view.

On the first day of July, 1862, the trustees reduced the price of gas to private consumers, in such sum as in effect to neutralize the United States tax upon consumption. The wisdom of such a course was gravely doubted at the time, by many persons conversant with the manufacture of gas in Philadelphia, but the result of the year's business is believed to be a full vindication of the policy pursued.

The subject of the proper supply of gas coal has, during several months past, been a cause of great uneasiness to the trustees; a detailed statement of the matter has been made by the engineer, to which we beg especial attention.

In the month of April last, a committee of the board, accompanied by the engineer, visited Washington for the purpose of having an interview with the committee on ways and means of the House of Representatives and the finance committee of the Senate, upon the subject of the United States tax upon gas, and the committee considers that partly to its statements may be attributed the reduction in that tax from 25 to 15 cts. per 1,000 cubic feet.

In this connection, the board asks especial attention to the subject of the tax upon gas consumed in street lamps, and to the communications of the president of this board to the mayor and councils of the city, under date of January 2d, 1863, and January 24th, 1863, copies of which are annexed, marked exhibits C and D.

In consequence of the delay of the city government to make an appropriation to pay the tax due for September last, the property of the Gas-Works became liable to seizure; in order to avoid which, the trustees

advanced the money to pay it, and the same was paid under protest. A failure to pay the taxes for the months of October, November, and December, 1862, now demanded, will again render the works liable to seizure. If the trustees are obliged to pay the tax from time to time, as it accrues, the inevitable result in the end will be that an increased price must be paid by private consumers. It is to be hoped, therefore, that councils will, at an early day, make an appropriation for its payment. It is for councils to decide whether the Legislature intended to tax the gas consumed in the public lamps, and whether the payment of the tax can be successfully resisted, or if they doubt its legality, they should take measures to procure the judgment of the proper legal tribunal upon the subject, and thus relieve the trustees from grave responsibilities which do not properly belong to them.

For a history in detail of the business of the past year, and for other matters connected with the works, of great importance, we beg to refer to the reports of the engineer and the cashier, hereto annexed, which set forth with ability and clearness, the manufacturing and general matters connected with the trust.

In conclusion, the trustees think, that the continued success and prosperity of the affairs of the trust, which, if continued, will upon the first day of July, 1883, hand over the immense property of the Gas-Works to the city, free from all debt, a just subject of congratulation to the city.

WM. ROTCH WISTER, *Pres't*

Board of Trustees, Philadelphia Gas-Works.

Attest.—JOHN P. MURTA, *Registrar.*

January 29th, 1863.

ENGINEER'S REPORT.

To the Trustees of the Philadelphia Gas-Works:

The Engineer-in-Chief respectfully presents his twenty-seventh Annual Report.

During the year 1862, the factories belonging to the Trust have produced 656,957,000 cubic feet of gas, of which

262,483,000	feet	were made at	First Ward.
262,483,000	do	do	Ninth Ward.
106,900,000	do	do	Fifteenth Ward.
6,302,000	do	do	Twenty-first Ward W'ks.

From the commencement of the Works, the quantity made has been over six thousand million, or, in exact figures, 6,169,553,000 cubic feet.

The greatest daily consumption in the year was 3,179,000 cubic feet.

The following statement shows the quantity of materials used in the production of the year.

	Tons.
Coal in store, January 1st, 1862	8,555
Coal bought in 1862	65,342
	73,897
Coal used in 1862	66,293
Coal in store, January 1st, 1863	7,604
	73,897
	Bushels.
Coke on hand, January 1st, 1862	39,762
Coke made in 1862	2,362,413
	2,402,175
Coke used in offices, yards and streets	40,579
" under retorts	1,310,144
" for exhausters, pumps, and lime-kilns	140,029
" sold in 1862	864,737
" on hand, January 1st, 1863	46,686
	2,402,175

The other materials used in making gas, are 2,518 cords of wood, 77 tons of soapmaker's residuum, and 145,333 bushels of lime in purifiers.

The number of meters and service pipes introduced, during the year, has been,

In the Wards comprised in limits of old City			222
"	"	Spring Garden and Penn	477
"	"	Moyamensing	214
"	"	Southwark	124
"	"	Richmond	42
"	"	Kensington	115
"	"	Twenty-first Ward	24
"	"	Twenty-second "	61
"	"	Twenty-third "	20
"	"	Twenty-fourth "	118
In all			1,417

Adding these to the number of meters and services before in use, makes the present number in use 44,090 meters, and 44,205 service pipes.

The applications for gas, registered during the year, have been:

At Seventh street Office	5,792
" Spring Garden Office	2,895
" Twenty-first Ward Office	99
" Twenty-second Ward Office	245
" Twenty-third Ward Office	109
" Twenty-fourth Ward Office	376
In all	9,567

Deducting removals and discontinuances, amounting to 8,088, shows an increase of 1,419, which, added to former consumers, makes a total of 44,429 customers now on the books of the Trust.

The lights added during the year are:

In old City	7,506
" Spring Garden and Penn	8,040
" Southwark	1,142
" Moyamensing	1,847
" Richmond	512
" Kensington	1,136
" Twenty-first Ward	482
" Twenty-second Ward	749
" Twenty-third Ward	191
" Twenty-fourth Ward	1,488
	23,043
Previously in use	505,957
Total	529,000

The number of street gas lamps in the Wards supplied by the City Works is 6,275

Of street mains, there has been laid 98,071 feet, making the aggregate length of main pipes belonging to the Trust, 2,253,569 feet, or 426 3-5 miles.

At the manufacturing stations, the new work has been limited to the completion of a coal store at the First Ward station, and an extension of the railway tracks, for the purpose of connecting with a branch road which the Pennsylvania Railroad Company is making, to bring the coal trains directly to the works in First Ward. In connection with this branch road, there will be extensive coal-shutes, into which the cars will dump their loads, so that they can be conveyed into the stores without expensive handling. The work on these improvements has been considerably delayed by the difficulty of obtaining materials and skilled labor; but it is now in a state of forwardness that will secure its completion early in the approaching season.

The new distributing gas-holder, in the First Ward, was put in use in the early part of the year, and has been working satisfactorily from that time.

It has been of great service in relieving the deficiency of supply in the southern section of the city, and will become completely effective for that purpose when the requisite connecting mains are laid.

In accordance with the desire of the Board, that no new work that was not indispensable should be undertaken during the present unsettled state of business, the laying of the connecting mains, both for this gas-holder and the one recently built in the 20th Ward, as well as others much needed in the 22d and 24th Wards, has been postponed. But the increasing difficulty of giving to the consumers in those districts the supply of light to which they are entitled, makes it evident that the work cannot safely be deferred much longer. The completion of these two gas-holders to their full capacity has also been postponed for a time; the sections now in use being so prepared as to allow the telescopic sections to be added whenever they may be required. The cost of the two gas-holders and tanks, in their present state, has been $124,536 24. The additional cost of adding the telescopic sections, at the contract price, will be $34,250, making their entire cost, with a joint capacity of 1,600,000 feet, $158,726 24, or nine and nine-tenths cents per cubic foot of capacity of storage. The original estimate for these gas-holders was eleven cents per foot for the smaller, and ten cents for the larger. A large amount of repairs have been done, during the year, to the mains and service pipes distributed through the streets; a portion of them became necessary in consequence of the destruction of several streets and houses by the disastrous flood in September, which swept away a portion of the large main leading to the 20th Ward gas-holder, and numerous sections of smaller main and service pipes, and street lamps located along the line of Cohocksink creek. Some of the repairs were directed to lines of old mains, of which the joints had become defective to an extent that added much to the annual loss of gas by leakage. There yet remains much to be done in this way, which, when accomplished, will effect a saving that will materially increase the profits of the Works.

It gives me pleasure to state that the work in this department has been conducted by Mr. John A. Miskey, the Superintendent, with his accustomed energy and skill. Much inconvenience and expense, as well as apprehension of more serious results, have arisen from the failure in the delivery of the supplies of coals in accordance with the stipulations of our contracts. The failure is attributed by the contractors to the crowding of the railroads by the military operations of the Government.

Notice was given to the contractors of the deficiencies in the monthly deliveries as they occurred; and, after repeated disappointments of the expectations founded on promises of increased facilities for transportation from the mines, orders were given for the purchase of several thousand tons of foreign coals in New York. By these purchases a supply was obtained of coals of various kinds in sufficient quantity to avert the impending danger of the stoppage of the Works

Judging from the present aspect of the domestic coal trade, it will probably be necessary to make arrangements seasonably to procure a part of the regular supply of coals from abroad until such time as the completion of new lines of internal improvement shall enlarge the domestic field of supply of gas-making coals. By making proper arrangements at an early season, it is probable that the requisite supply can be obtained at much lower cost than was paid for the coals recently bought under the pressure of extreme necessity.

As the deplorable fraud recently reported to the Board has naturally and properly given rise to a desire on the part of the trustees and others to scrutinize the accounts kept in the various departments of the trust, a brief statement of the system in the engineering department may not be out of place at this time.

At each manufacturing station, full records are entered in books prepared for the purpose, of the quantity of gas made, and of the coal, coke, and other materials used in the factories; the various entries being made by a clerk from written reports furnished by the weighers and measurers. In all cases, where it is practicable, the original records contain the details for each hour of the day and of the night; and in all other cases they embrace all determinable particulars of each day's operations and results.

These entries are made daily as the transactions occur, and at the end of every week a report is required from each station in a prescribed form on a printed blank, embracing the results of the week's work, and another general statement in the same form at the close of each month, which is tested by an account of stock on hand. At the end of the year, a general summary is prepared from the monthly statements, which is also tested by an account of stock derived from careful measurements and counts of the materials on hand at every station. All these different statements are kept on record in a form that facilitates their frequent comparison, and such comparisons are regularly made, and the results exhibited to the engineer. This system is believed to provide for security against error in as great a degree as the nature of the manufacturing operations allows, and an examination of the records will show that no lapse or discrepancy has at any time occurred.

With regard to the accounts of sales, the regulation of the system, so far as it is controlled by the engineering department, relates solely to the measurement and delivery of things sold at the manufacturing stations, and has no cognizance of the disposal or keeping of the money received, which is placed by the rules of the trustees under the exclusive care of the financial department.

No gas is sold at any of the factories; their sales being limited to the by-products, such as coke, tar, foul lime, and other refuse materials.

The sales of these things are entered in daily sales books, kept by the sales clerk at each factory, in full detail of date, quantity, and price; and of the name of purchaser, if they are delivered at his place of business or residence. The sales of each day are checked and tallied by a comparison of the entries in the sales book

with the tickets that have been issued by the sales clerk to the buyer. These tickets are the orders on which the things sold have been delivered from the yard; they are retained by the person who has charge of the delivery, and by him given into the custody of an officer who has nothing to do with the sales but to check and tally them by the tickets. The money received by the sales clerks at the First and Ninth Ward Stations is paid over, from day to day, to the first clerk at the Works, by whom in turn it is handed to the cashier at the Central Office, each recipient giving a receipt for the sums paid on account; and, at the close of the month, it was the original plan to settle and audit the original sales book, and place upon the final page of the monthly account a receipt in full for the whole of the monthly sales.

The latter most important part of the system appears to have been discontinued some years before this fraud commenced, and thus an opportunity for its perpetration was given. The discovery of the crime was inevitable whenever the sales book should be brought into comparison with the account of receipts at the Central Office, and could not easily be made in any other way, as the existence of the deficit was masked by the ordinary fluctuations in the current sales, which are of greater magnitude than the sums abstracted in any month or year. For, large as is the amount stolen, its proportion to the aggregate receipts at the Central Office for the same period is less than three-quarters of one per cent., and is equal to only one-fiftieth part of the increase of the receipts during the five years covered by the fraud over those of the five years immediately preceding. This matter will be better understood by a comparison of the principal items of the accounts of manufacture and sales during several successive years.

The subjoined tabular statements will present such a general view, compiled from the records of ten successive years, divided into two periods of five years, one of which comprises the whole time in which the fraud was in progress, and the other embraces an equal interval of time immediately previous. All the important items that materially affect the cost and proceeds of the manufacturing operations are here presented.

These are, the coals bought and used; the coke made and used and sold; the whole product of gas, and the whole amount of the receipts from sales.

The first five year term embraces the years 1853, '54, '55, '56, '57—the second term, the years 1858, '59, '60, '61, '62. The latter including all the deficits discovered.

	First term of five years.	Second term of five years.
Tons of coal bought.....	190,464	289,567
Increase in five years.....	99,103—or 52 per cent.	
Tons of coal used.....	186,991	301,228
Increase in five years.....	114,237—or 61 per cent.	
Bushels of coke made.....	6,550,961	10,537,389
Increase in five years.....	3,987,328—or 61 per cent.	
Bushels of coke used.....	3,934,524	6,312,148
Increase in five years.....	2,377,624—or 60 per cent.	
Bushels of coke sold.....	2,615,587	4,225,241
Increase in five years.....	1,609,704—or 61½ per cent.	
Cubic feet of gas made.....	1,783,237,000	2,971,393,000
Increase in five years.....	1,188,161,000—or 66½ per cent.	
Total receipts for gas, coke, and tar, and all other products sold, as shown by the published statements of Profit and Loss account.	$3,542,569.43	$5 899,183.49
Increase in five years.....	$2,356,614.06—or 66½ per cent.	

The receipts from all the products are necessarily united in one sum, because they are thus stated in the annual reports of the cashier for several years past.

These figures, derived from the printed annual reports of ten successive years, show that the amount of coke sold during the years of this fraud has increased in a larger ratio or percentage than the amount of coals bought or used. And also, that the amount of cash receipts from all products sold has increased in an equal ratio with the quantity of gas made, and, consequently, the receipts for all by-products sold have increased quite as much, proving that the growth of the works in profitable results has been more than sufficient to mask entirely the fraudulent abstractions from their current income. The alterations of figures discovered in the investigation of this fraud, are not found in the original records of cash sales kept by the sales clerk, which are found to be regular and undefaced; but in a summary abstract copied into another book kept by the defaulter himself; they, therefore, do not affect the correctness of any of the accounts either of the cashier or the engineer, and serve no other purpose than to prove the identity of the criminal by a record in his own handwriting, and to evince a design to provide against detection, if the original practice of monthly settlements should be resumed, by presenting this altered summary for audit instead of the original records in the sales book.

Had this settlement and audit been resumed, these erasures and alterations must have drawn attention to the state of the accounts, and made sure of his immediate detection. In ascertaining the extent and duration of the defalcation, the method adopted by the intelligent officer to whom the duty was assigned, was to institute this audit of each monthly account in comparison with the monthly receipts at the central office, and carry it back of the time when it had been discontinued.

The monetary accounts assigned to the engineering department under the By-Laws of the Trust are confined to disbursements for the current expenses of the manufacture and distribution of gas, and the construction and extension of the works and their connections. No other moneys pass through the engineer's hands than such as are appropriated to his department by the trustees, on estimates rendered by him twice a month. The purchases of most of the important materials in regular use are made under contracts duly authorized by the Board, and recorded in writing ever the signatures of the contractors and the engineer-in-chief. The things delivered under these contracts are weighed or measured as the terms of contract require, by officers properly qualified and sworn to the faithful performance of their duty; the certificates of the weigh-masters are kept on file in the proper office, and from them the bills rendered are verified. The bills, after verification and scrutiny by an accountant, are laid before the chief engineer and his first assistant for inspection, and division under the heads of expenditure to which they must be charged; the inspection and division being certified by the initials of the engineer at the foot of each bill.

Full lists of all the bills certified as correct are prepared by a clerk, and twice a month these lists, together with the certified bills, are laid before the committee on accounts of the Board, who, after examination and comparison with the list, affix their signatures of approval on the face of the bills and report them to the Board, with a resolution authorizing their payment. Materials and work not under contract are obtained on printed requisitions or orders, cut from an order-book which has on its margin a counterpart of the order issued, identical in number and date, recording the things ordered, the person drawing the order, and to whom directed.

The orders cut out are retained by the person to whom they are issued until his bill is rendered for payment, when he returns them with the bill. These bills then pass through the same course of examination as those rendered under contracts. The bills thus passed by the committee and board are placed on file for payment at the principal office, where they are paid by checks of the engineer, and receipts taken in duplicate; one of which is on the bill, and the other on the margin of the check-book bearing a number corresponding with the check and with the number endorsed on the bill.

All the payments made in each semi-monthly interval between the meetings of the Board, are entered in duplicate in a certificate-book having consecutive numbers to the entries identical with those on the margin of the check-book; one copy of the certificate signed by the president of the board of trustees and by the registrar is delivered to the engineer as his individual voucher; the other being retained by the trust.

All these payments are likewise recorded in a large account-book, ruled and headed to exhibit the head of expenditure to which each payment belongs; the entries in this book are closed, and the whole account balanced at each semi-monthly meeting of the board; and a certificate is appended by the committee on accounts recording the examination of the accounts, the balance unexpended, and the sum to be accounted for by the engineer after he shall have received the amount which is estimated for the expenses of the next term. At each stated meeting of the board of trustees, a report is presented by the engineer, giving a statement of his account with the trust since the previous meeting; showing the unexpended balance of his last appropriation, and a detailed estimate of the sum required in the next interval of meeting. Accompanying this report are the vouchers for his disbursements arranged in the manner before described.

The report and vouchers are submitted to the committee on accounts, who report thereon to the board, and present a resolution for such appropriation as they find to be necessary for the current business of the trust.

The narrative of these matters may be tedious, but it is not easy to convey a clear idea of such complex and extensive accounts in very brief terms.

The absence of many of the skilled employees who have joined the army, and the want of full experience in their temporary successors, has thrown upon the assistant engineers much extra duty and responsibility: and their unhesitating assumption of this additional labor and vigilance requires this acknowledgment of their faithful devotion to the interests of the works.

Annexed are the usual tabulated statistics, containing a concise history of the transactions of the works for each year of the more than quarter century through which they have passed.

Respectfully,

JNO. C. CRESSON,
Engineer-in-Chief.

Philadelphia Gas-Works,
Jan. 9, 1863.

REPORT OF THE CASHIER.

[The report of the Cashier is too long to permit of its publication in our columns. We give merely the statements of receips and payments for the last year, together with the aasets and liabilities.—ED.]

CASH ACCOUNT

Dr.

Balance on hand January 1, 1862.....		47,934 12
RECEIPTS IN 1862.		
For sales of gas, coke, tar, lime, rents, and U. S. Tax.		1,278,824 61
For main and service pipe.....		10,388 02
For interest and profits on City Warrants.....		861 00
For interest and premium on loans sold.....		1,880 84
For account of the Sinking Fund:		
For interest on Gas Loans.....	31,542 00	
For interest on City Loans.....	17,372 50	
For City Loans paid off.....	19,400 00	
For sales of Loans 7 and 8.....	123,100 00	
		191,414 50
For sales of Loan 11.....		255,800 00
For interest on the Sinking Funds of the following Gas-Works:		
Germantown.....	345 00	
Southwark and Moyamensing.....	309 00	
Manayunk.....	192 00	
Richmond.....	60 00	
		906 60
For City Warrants on hand January 1, 1862, paid off.		25,733 35
		$1,823,743 04

Cr.

PAYMENTS IN 1862.

For the construction and enlargement of the Works.	113,188 22
For the extension of the street mains.....	57,876 49
For service pipes, meters, &c.....	46,570 65
For coal and other materials used in the manufacture of gas, wages of workmen, and charge of the public lamps.....	692,566 30
For repairs of the Works, street mains, &c.....	99,989 43
For incidental expenses, salaries, &c.....	167,787 48
For interest on loans.....	50,691 20
For investments for the Sinking Fund.....	110,190 00
For amount paid City Treasurer, for interest on Loans 9, 10, and 11, and appropriation to the Sinking Funds of Loans 10 and 11.....	103,696 00
For interest on and appropriation to the Sinking Fund, for the redemption of $450,000 of City Debt.	36,000 00
For interest on Gas Stocks.....	18,027 75
For investments of the Sinking Funds of the Southwark, Germantown, Manayunk, and Richmond Gas Companies.....	7,370 00
For Loan 1st, redeemed.....	150,000 00
For State Tax on Gas Loans and Gas Stocks.....	8,006 62
For Brokerage on Loans sold.....	125 00
	$1,661,585 14
Balance.....	162,157 90
	$1,823,743 04

STATE OF THE WORKS, JANUARY 1, 1863.

ASSETS.	
Works	1,507,685 73
Street mains	1,067,361 94
Service pipes and meters	607,185 30
Public lamps	2,338 15
Cash	162,157 90
Suspended debt	24,829 83
Stocks belonging to the Sinking Fund	1,129,039 55
Coal on hand	52,119 75
Coke on hand	2,567 73
Wood on hand	2,665 00
Materials for repairs	3,650 00
Due for gas sold, delivered, and on hand	204,165 07
Due for coke, tar, &c	11,000 00
Interest on City Loans, due January 1, 1863	10,364 50
Wharf lot on Schuylkill	6,000 00
Site of the new Gas-Works	86,957 69
Spring Garden do.	300,000 00
Moyamensing do.	80,000 00
West Philadelphia do.	50,000 00
Frankford do.	20,000 00
Germantown do.	90,000 00
Richmond do.	16,500 00
Southwark & Moy'g do.	113,240 00
Manayunk do.	81,000 00
Kensington do.	90,717 79
Stocks belonging to the Sinking Fund in the hands of the City Treasurer, for the redemption of $450,000 of the City debt	92,385 00
Sinking Fund of the Southwark and Moyamensing Gas-Works	95 06
	$5,764,025 99

LIABILITIES.	
Loans 2 to 11	$2,595,000 00
Dividends unpaid	495 00
Interest on Gas Loans	11,880 75
Interest on Gas Stocks	9,797 05
For coals, repairs, and materials used in the manufacture of Gas	153,296 64
Sinking Fund	1,182,947 87
Sinking Fund for the redemption of $450,000 of city debt	92,385 00
Stockholders of the Southwark and Moyamensing Gas-Works, for the cost of said Works	113,240 00
Stockholders of the Manayunk Gas-Works, for the cost of said Works	81,000 00
Stockholders of the Richmond Gas-Works, for the cost of said Works	16,500 00
Stockholders of the Germantown Gas-Works, for the cost of said Works	90,000 00
Sinking Funds of Germantown Gas-Works	772 75
Do Manayunk do	672 38
Do Richmond do	160 72
State of Pennsylvania, for State Tax on Gas Stocks	902 22
City of Philadelphia, for works taken as per Ordinance of March 20, 1855	450,000 00
For Government Tax on the private consumption of Gas in the months of September, October, November, and December, 1862	20,459 81
Profit and loss, for amount of suspended debt	24,829 83
Contingent fund	919,776 47
	$5,764,025 99

Annual Registry of Consumers and of Private and Public Lights.

DATE.	Applications.	Removals and Discontinuances.	Total No. of Consumers.	PRIVATE LIGHTS. Added.	PRIVATE LIGHTS. Totals.	PUBLIC LIGHTS. Streets.	PUBLIC LIGHTS. M'k't Houses	PUBLIC LIGHTS. Squares.	PUBLIC LIGHTS. Totals.
1836	301	24	277	2,952	2,953	165			165
1837	497	108	666	3,862	6,814	136			301
1838	849	174	1,341	4,288	11,102	133		62	496
1839	946	300	1,987	5,380	16,482	102	18		676
1840	788	382	2,393	3,317	19,799	112	1		789
1841	874	493	2,774	4,387	24,186	13	8		810
1842	845	541	3,078	3,054	27,240	30			840
1843	986	635	3,429	3,418	30,658	59			899
1844	1,000	503	3,926	4,940	35,598	195			1,094
1845	1,147	629	4,444	5,754	41,352	112			1,206
1846	1,465	717	5,192	8,138	49,490	96			1,302
1847	1,869	887	6,174	12,987	62,477	84	10		1,396
1848	1,956	1,002	7,128	13,935	76,412	21			1,417
1849	2,191	1,180	8,139	18,050	94,462	74			1,491
1850	2,227	1,150	9,216	20,542	115,004	72	13		1,576
1851	2,529	1,339	10,406	21,616	136,620	124			1,700
1852	3,004	1,747	11,663	20,550	157,170	118			1,818
1853	3,280	1,954	12,989	25,432	182,602	87		23	1,928
1854	2,884	1,969	13,904	18,127	200,729	27			1,955
1855*	17,479	8,485	22,898	82,487	283,216	1,368	26		3,349
1856*	6,272	4,626	25,544	32,225	315,441	84			3,433
1857	5,504	4,744	26,304	17,046	332,487	68			3,501
1858*	11,801	8,152	29,953	41,959	374,446	562	21	6	4,090
1859*	14,008	6,381	37,580	61,781	436,227	965	† 18	49	5,079
1860	10,876	7,256	41,200	38,734	474,961	478	44		5,601
1861	11,594	8,784	44,010	30,996	505,957	398	4		6,003
Totals	107,172	64,162		505,957		5,743	120	140	

* Including those received from private gas companies.
† During the year 1859, 18 lights were added in market houses, and 43 discontinued.

Statement of Meters set each year.

DATE.	Services Laid.	3 Light.	5 Light.	10 Light.	20 Light.	30 Light.	45 Light.	60 Light.	100 Light.	150 Light.	300 Light.	500 Light.	1500 Light.
1836	251	108	98	31	9	2	3						
1837	411	301	77	19	6	2	3		3				
1838	690	442	159	61	13	9	2	1	3				
1839	649	421	118	75	26	6	3						
1840	350	198	78	54	13	3	2		2				
1841	575	203	93	63	14	2							
1842	299	157	76	57	6	3							
1843	348	180	110	50	7	1							
1844	506	292	129	72	5	3	1		1				
1845	523	311	151	49	7	4		1					
1846	761	390	237	113	14	4	2	1					
1847	999	481	300	202	12	1	3						
1848	971	498	333	196	25	4	3	1	1				
1849	1,029	366	366	234	46	7	5	2	3				
1850	1,079	435	412	165	50	8	3	3	3				
1851	1,211	534	373	204	76	15	4	2	3				
1852	1,261	638	334	200	60	18	7	3	1				
1853	1,364	668	360	167	92	23	12	6	15	1			
1854	939	470	207	127	89	29	14	2	1				
1855*	8,110	4,290	3,158	369	150	28	28	11	23				
1856*	2,323	1,055	698	375	144	23	15	8	4			4	
1857	734	209	220	184	95	12	9	2	3				
1858*	3,717	2,491	643	298	166	40	8	3	3				
1859*	7,529	5,432	1,213	548	249	47	16	10	11			2	1
1860	3,533	2,118	709	462	178	29	18	13	10	1			
1861	2,829	1,621	599	392	174	17	15	5	4		2		
Totals	42,788	24,239	11,251	4,767	1,721	340	176	74	94	2	2	6	1

* Including those received from private gas companies.

Board of Trustees of the Philadelphia Gas-Works for 1863.

President.
William L. Hirst.

Trustees.

William M. Reilly,	Charles L. Wolff,
William L. Hirst,	Anthony Miskey,
John Manuel,	Richard Ludlow,
Wm. Rotch Wister,	Edw. H. Trotter,
Samuel Bell, Jr.,	John McCarthy,
Charles A. Rubicam,	Wm. W. Burnell, M.D.

Engineer.
John C. Cresson,
Appointed Aug. 26th, 1836.

Cashier.
William Fennell,
Appointed April 10th, 1857.

Registrar.
John P. Murta,
Appointed April 10th, 1857.

ARE GAS-HOLDERS LIABLE TO EXPLOSION?

(From *Newton's London Journal of Arts.*)

During the progress of a recent conflagration which occurred in the immediate neighborhood of one of the largest of the metropolitan gas-works, considerable excitement and alarm were experienced by many of those living in the adjoining streets, or present in the crowd, from the idea that if the fire extended to the gas-holders, which at the time were filled with the gas required for the supply of the public and private lights, an explosion of unexampled force and destructiveness would be the result. It was stated that many persons hastened away from the locality when they heard that there was a probability of the flames reaching the gas-works; some thinking that if an explosion occurred, even the dome of St. Paul's might be endangered; others, that at least Blackfriar's bridge would be destroyed; and, indeed, the public mind was filled at the moment with that vague and unreasoning sense of danger, which, operating upon great masses of people, effectually prepares the way for the most dangerous panic.

It is very desirable, both in the interest of the gas-companies and of the public, that the erroneous ideas which gave rise to these really absurd, although in some respects natural, fears, should be corrected. There is but one way in which this can be done, that is, by affording information concerning the agents and forces involved in the question; so that a clearer conception of their nature may be acquired, and the undefined terrors, which in this, as in other similar cases, are engendered and fostered by ignorance, may be removed by a rational consideration of the physical and chemical laws to which such agents are subject. In accordance with this view, there are, then, to be considered—first, the character of coal-gas with reference to the question of explosion; secondly, whether explosive mixtures of coal-gas can be produced by circumstances attendant upon a fire extending itself to the gas-holders. With regard to the first part of the inquiry, it must be remembered that the gaseous mixture, which we know as coal-gas, is not *per se* an explosive, although it is an eminently combustible, material. When ignited, it burns with the greatest rapidity, evolving an immense flame, and producing a very great amount of heat; but there is no more tendency to explosion than when coals, or any other combustible substance, are burning in a furnace. Certain constituents of coal-gas require a very high temperature to inflame them, others are readily inflamed at a red heat; but the lowest point at which any one of its constituents may be inflamed must be taken as the index of the point of inflammation of the mixture, and this may be, perhaps, set at a red heat. When coal-gas burns in the air, it is, of course, at the expense of the atmospheric oxygen, the process simply consisting in the oxidation of the carbon and hydrogen of the gas; and this action is necessarily confined to the exposed surface. Under such circumstances, the oxidation goes on gradually, and a certain time is required to bring in contact the combustible atoms and the oxygen; we have then burning, but no explosion. To effect complete oxidation, coal-gas consumes, or rather combines with, about two and half times its bulk of oxygen, which are equal to more than twelve times its bulk of atmospheric air. If, however, the required quantity of oxygen, or of air containing the oxygen, be mixed with coal-gas before the latter is inflamed, and means of inflaming the gas be then applied, combustion will not progress gradually, as it does when the gas alone is inflamed, but it will occur atomically as it were,—that is, each atom of gas finding in its immediate proximity an atom of oxygen, the union between the two will take place throughout the whole volume of the gaseous mixture instantaneously, and a violent explosion will be the result. To produce this explosion, oxygen, in certain proportion, must be mixed with the gas before ignition. In the absence of oxygen, previously so mixed, there can be no explosion.

Sir H. Davy, in his important and interesting experiments upon this subject, found that light carburetted hydrogen, the most powerfully explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from

eight to nine times its bulk of air will produce the most explosive mixture with coal-gas: but, as was remarked before, the air and gas must be mixed previously to inflammation. No matter how rapidly the air may be supplied when the gas is burning, it will merely increase the fierceness of the combustion: there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from about 7 to 25 per cent. of volume; if it fall short of, or exceed, that proportion, it will burn away quietly, and not explode. So it will be perceived that, in the contents of the gas-holders, we have to deal with a material which is combustible in the highest degree, but which in itself, even when burning, has no tendency to explode, and which cannot be made to explode excepting by changing its normal state by previous admixture with a foreign gas, viz., oxygen.

There is another property of coal-gas which relates to this inquiry, and which it possesses in common with all matter,—that is, expansibility, under increased temperature. When a gas is heated, its volume is augmented. For every degree of Fahrenheit's thermometer this augmentation equals 1-480th part of the bulk of the gas at 32°, so that the volume of a gas being 480 cubic inches at 32°, it would be 481 at 33°, 482 at 34°, and so on. The qualities of coal-gas, then, which relate to the question of explosion of gas-holders are—combustibility, capability of forming explosive mixtures with oxygen gas or air, and susceptibility of having its bulk or volume increased by rise of temperature. It remains to see how far circumstances arising from the application of heat or flame to the exterior of a gas-holder could so affect or modify its contents as to produce explosion, as many persons have seen cause to dread. In the gas-holder itself we have an apparatus very well calculated to preserve the gas which it contains from any admixture with the external atmosphere; and, indeed, under all ordinary circumstances, such admixture is impossible. It must be remembered, that the gas-holder, formed of strong plate iron, is so arranged that it is only capable of moving vertically, under the guidance of firmly constructed iron rods and pillars, and that, during all its movements, its lower edge remains immersed in a tank of water; were it not so, its contents could not be preserved at all, as it must be remembered that gas-holders *rise* in consequence of the elastic raising force of the gas which is forced into them, and are not *suspended*. The moment the gas is removed by any means from the holder, the latter sinks by virtue of its weight, which operates as a powerful expulsive force, and is, in fact, the only force which sends the gas through the almost endless ramifications of pipes by which it is distributed for public consumption. Are there, then, any conditions in which the gas in the holder could become mixed with a sufficient quantity of air to be rendered explosive; those conditions, of course, being produced by the action of heat applied externally to the holder?

Some years since it happened, at one of the London gas-works, that a portion of the upper part of the heavy iron framework which guides the holder became detached, and, falling upon the top or crown of the holder, crashed through, making a large hole in the iron plate. The weight of the holder caused the gas to rush through this opening with great velocity; reaching a light which was burning near, it became ignited, and, as may be supposed, a flame of immense size and force—a sort of gigantic blow-pipe flame—was produced; as the aperture was of considerable size, the whole of the gas was, however, expelled from the holder in a very short time, and no damage was done,—nothing in the remotest degree resembling explosion having occurred. Suppose, during a great fire at a gas-works, that, by any means, a gas-holder became perforated, the only result would be that just described; and even if the perforation were made in a part of the holder from which the flame might prove a means of extending the conflagration, there would be no danger of explosion, unless, as we have seen before, the gas-holder contained a mixture of gas and atmospheric air or oxygen. Is there, then, any probability of such an explosive mixture being produced in a gas-holder through the effect of an external fire?

If a gas-holder, filled with gas, were exposed to the action of violent flame, it is evident that, in accordance with the law of expansion already explained, the volume of the gas would be rapidly increased. It is scarcely in the nature of things that a large gas-holder should be uniformly heated on every side; but, for the sake of illustration, let it be supposed that the whole mass of the gas was raised to 1,000°, a very high temperature, about equal to bright-red heat; under these circumstances, the volume of the gas would be nearly tripled, so that from a gas holder capable of containing 3,000 cubic feet, nearly two-thirds of the contents would be expelled by mere expansion,—that is, if the holder were at first filled to its full capacity. As the holder cannot rise out of the water of the tank, owing to the iron framework by which it is held, the excess of gas, that is 2,000 cubic feet, would be forced under the edge of the holder, and would bubble up through the water, a thing which not uncommonly happens on a limited scale in gas-works when the holders are over-filled: as the gas thus escaped, it would, of course, inflame, and a succession of irregular fierce combustions, so to speak, would be the consequence; but, as the gas could not previously have been mixed with air, there would be no explosion. Now, let us suppose the source of heat to be removed, the fire about the gas-holder to be subdued, for example, the contained gas would cool, and, in cooling, would contract to the natural density; this being so, it would only be capable of occupying one-third of the capacity of the holder, which would, of course, descend as the contraction progressed, and the result would be, not that any mixture of the air and gas had been produced in it, but that the gas-holder would be found less elevated from the tank by two-thirds of the height which it reached when first subjected to the action of the heat. Let us, however, take an extreme case, in which the holder, filled with gas, expanded to three times its normal volume, is suddenly cooled, and in which, from the action of the fire, the guides or pulleys of the holder itself have been so deranged that the holder cannot descend upon the contracted gas; it is obvious that the gas, in cooling, will, as in the former case, be only capable of filling one-third of the holder; the water of the tank cannot rise to fill the vacant space; atmospheric air would therefore pass under the edge of the holder, or blow through the water-seal; and very shortly the contents of the holder would consist of about one-third of gas and two-thirds of atmospheric air; even then the mixture would not be explosive. Davy's experiments show that, when the gas present in the mixture exceeds from 20 to 25 per cent., it burns quietly, and does not explode; and in the above case, a most unlikely one to occur, the gas is present in the proportion of 33 per cent. If a gas-holder became fixed by any means, in the manner spoken of, and by accident the side of the tank were broken down, so that the water flowed away from the holder, the contained gas would be in communication with the atmospheric air; in that case, however, the mixture of the two would be but a slow operation, as, by its superior levity, the gas would continue to occupy the suspended holder until sufficient time had elapsed for diffusion of the gas and air to take place.

If flame were to be brought in contact with the contents of the gas-holder shortly after the occurrence of such an accident, which would, of course, happen if the injury to the tank were caused by fire, there would be still no explosion, but burning of the gas from the surface upwards, as in a common lecture table experiment, where combustible gas, contained in an inverted jar, is ignited at its inferior surface, and extinguishes a lighted taper plunged into its mass. As to the gas-holder itself being so much damaged by the action of the heat or flame, as to be rendered incapable of containing the gas, such a thing is scarcely possible. It is well known that rivetted sheet-iron vessels will bear a lengthened exposure to a red heat before they are so much injured as to become leaky; and if, in the case of the gas-holder, the sudden action of powerful flame, striking on its exterior, were so to twist or warp the plates, that the gas could escape, there would be simply combustion of the gas as it issued from the openings, as in the case of the perforated gas-holder first discussed.

A little consideration of this subject seems to show, then, that the explosion of a gas-holder, from circumstances created by the influence of conflagration in a gas-works, is an event, not perhaps beyond the bounds of possibility, but so far removed from anything like probability, that any serious fears in connection with it must be looked upon as entirely groundless. Such an occurrence seems never to have taken place in the whole course of gas-making practice; and if we reflect upon the natural laws which operate in the matter, it is to be presumed that it could scarcely be made to happen under the influence of any external circumstances. It cannot be denied that a conflagration may be increased to a fearful extent by the contents of a gas-holder becoming ignited, but it may be safely questioned if, in any case, there is the slightest danger to be apprehended from explosion.

T. W. Keates, F.C.S.

14 *Chatham Place, Blackfriars.*

Nashville, Tenn.—The Nashville Gas Company recently refused to transfer to citizens of Cincinnati, shares of stock which had been regularly and legally purchased, alleging as the ground of their refusal, the Confiscation act passed by the rebel Congress. Gen. Mitchell promptly met the case by ordering the officers of the company to make the transfer at once. His order lays down this general principle in conclusion:

"*And it is hereby further Ordered,* That all individuals and corporations attempting to avail themselves of, or to obey any law of the so-called Confederate Congress, or any statute of any Legislature passed subsequent to the passage of disloyal acts by such Legislature, shall forfeit all their property in pursuance of the Confiscation act, passed by the Congress of the United States; and the individuals attempting, for themselves or for corporations, to commit this act of treason shall be sent South of the lines of the United States Army."

Advantages of White Lamp-posts.—A few years ago, New York was visited by that rollicking specimen of upper young England, the Marquis of W———d, whose exploits at home had already swelled the records of Bow street to huge dimensions.

My lord found the Yankees a benighted race, not at all "up to snuff," and thought he would show them a thing or two, and so he did. The daily papers teemed with the scape-grace's frolics, while the city watch were kept busy putting down small riots excited by this aristocratic young gentleman's pugnacity.

One very dark night, or rather one very dark morning, my lord Marquis rose from the table pretty well emptied of wit, but filled with champagne and cognac, and started for his hotel. The streets he found exceedingly short, with the extraordinary feature of houses at each end—they were wide enough, no end to the width—but very short, as it was only by tacking from house to house that he could make his way at all.

At length the ground became unsteady, and supposing the darned Yankees had been getting up an earthquake on purpose to annoy him, he determined to avail of the first lamp post and unite his fate with it's.

A black object stood at the corner, and to it my lord tackled, with both arms, in tight embrace around its neck. An awful squeal was the result, and one or two watchmen rushed to the spot. His lordship had mistaken a lady of the colored denomination for a lamp-post; and she, furious with injured delicacy, preferred a complaint against him for assault and battery.

Being suddenly attacked with the hiccups, the Marquis could not enter into an explanation at the time, so he selected the easiest spot on the brick floor of his cell, and slept off the effects of the debauch. When brought before the magistrate, he explained that he supposed he was embracing one of the black lamp-posts, and accounted for the absence of the light by the fact of its being nearly sunrise, when street lamps at home were extinguished; and yet he observed that he thought he smelt escaping gas, while the squeal he took for the whistle of the gas, turned full on, from which he inferred that he had accidently opened the valve; and indeed it was for that he supposed he was arrested.

An apology in the shape of a ten-dollar bill was accepted, and to prevent a recurrence of such mistakes on the part of English Marquises, an ordinance was passed requiring lamp posts to be painted white, which has since been done.

RELATIVE VALUE OF DIFFERENT SOURCES OF LIGHT.

Artificial light being essential to all classes of a civilized population, it becomes an important object to ascertain the relative value of the different modes of producing it, and of the materials employed. Every effort which tends to simplify the mode of producing light, and even the smallest abatement in price, which progressive discovery effects in this direction, is a most valuable boon to the poor; every augmentation of the brilliancy and whiteness of the light is a welcome addition to the comforts of the rich; and every improvement in the increased light of public ways and places is a benefit common to all. Without entering more minutely into the subject, it is evident that the value of any means of illumination must depend upon the *amount of light* evolved, and the *quantity of lighting material* consumed. A candle, or a lamp, &c., will be the more valuable the more light it gives from a certain quantity of tallow or oil. The consumption of illuminating material, and its price, together give the cost of the light, to which the outlay caused by the method of using the light must in many cases be added. The determination of the quantity of illuminating material consumed, as well as the calculation of its cost, is a simple matter within everybody's comprehension; the determination of the quantity of light, however, requires more explanation. Light cannot be measured or weighed like ponderable matter; it is not possible, therefore, to estimate how much light a flame emits, but it can be ascertained how much more or less intense the light from one flame is, as compared with that from another.

All determinations of this nature are, therefore, comparative. The most casual observation of two flames of equal size—for example, that of a gas-burner and a candle—shows the one to be much more intense than the other. The eye is more powerfully affected by the gas-flame; it is said to be brighter; and the impressions thus produced are attributed to the relative *intensities* or *illuminating powers* of the flames. The relations of intensity between two sources of light are considered a measure for the quantity of light when the time is taken into consideration, or express the relation of quantity, when the time in both cases is the same.

The dissemination of light being entirely effected by radiation, the intensity is said to express the sum of the rays which are emitted to a certain surface,—for example, to a square foot. It is evident, that the number of rays must diminish with the distance from their source, as the rays diverge or separate more and more from each other. According to the laws of optics, the intensity (or sum of impinging rays) from any source is inversely as the square of the distance from their source; when, therefore, a surface is illumined to the same extent by two flames, the number of rays of light from each will be proportional to the square of the distance at which each flame must be placed in order to produce an equal amount of light. It is upon this principle that the determination of the relative intensities of different flames depends; the measure being the distance to which the different flames must be brought, in order to produce an equal amount of light. Practically, however, it is not possible to determine the brilliancy of a flame even approximatively; the light, therefore, is not observed, but the absence of light or the *shadow;* and this upon the assumption that under similar circumstances the brighter light will produce the deeper shadow. In experiments of this kind, a board covered with unglazed white paper is often used, before which, at a distance of from 2 to 3 inches, an iron rod is placed, which has been previously blackened by holding it in the candle. Opposite this board, but at the same height, the flames to be compared are so placed that the shadow from the one shall fall close to that of the other upon the board; the stronger flame is then removed, or the weaker one approached, until both shadows appear equally deep, when their respective distances from the centre of the flames are measured. The squares of these distances give the relative intensities of light: if a flame, for example, has been three times as far removed as another, its intensity will be to that of the latter as $3^2 = 9 : 1$, or 9 times greater. As such observations are simultaneous, and of like duration, they give likewise the relative quantities of light; for unequal lengths of time, this has only to be multiplied with the respective durations. When one of these flames, therefore, burns 3 hours, and the other only 2, then the quantities of light evolved will be in the proportion $3 \times 9 : 2 \times 1$ or $27 : 2$. Some care and practice are required in making observations on the relative value of flames, and certain precautions are necessary, which, if not attended to, are liable to lead to erroneous conclusions. One circumstance in particular requires attention; when two perfectly similar shadows of this kind are observed from one side, the one appears brighter than the other, and the same is the case, the order only being reversed, when they are observed from the other side; so that the rule is, to observe them always from a position exactly opposite the board.

If the shadow test be taken as an indication of the quantity of light, and be made $= i$, the consumption of illuminating material being q, the formula for the *illuminating power* v will be $v = \frac{i}{q}$: an expression which, in making comparisons, shows the quantity of light for an equal amount of combustible material. The illuminating power, and the price of the material together, show the *cost or money value of the light*, which varies in an inverse ratio with the market price.

All determinations of the illuminating power being entirely relative, a suitable flame for comparison must be selected, which will evolve as far as possible an equal amount of light during the whole period of the experiments. No flame has yet been produced which perfectly fulfils this condition, but that of Carcel's clock-work lamp is of such very uniform brilliancy, remaining unimpaired for several hours after it has been ignited, that lamps, candles, and gas have very generally been compared with it as a standard. On comparing two exactly similar lamps of this kind in such a manner that one was kept constantly burning, while the other was ignited for each observation, it was found that the intensity of light, at first being 100, increased in half an hour to 103, in one hour to 116, and in four hours to 117, which then remained constant for four consecutive hours. The very slight change observed in the intensity of Carcel's lamp depends, as has already been explained, upon the uniform level and superabundant flow of the oil; the increase of brilliancy with the progressive burning may possibly be accounted for by the decreasing quantity of heat withdrawn from the flame by the neighboring parts in proportion as these become warmer, and also, perhaps, by the excess of oil being too great at the commencement, and becoming reduced to the proper quantity by the decreasing tension of the spring employed for working the pumps.

The photometer of Bunsen is now preferred to the shadow test by gas-engineers and others for estimating the comparative value of flames. It consists of a sheet of cream-colored letter-paper, rendered transparent over nearly the whole surface by a mixture of spermaceti and rectified naphtha, which is solid at common temperatures, but becomes liquid on the application of a very gentle heat. The mixture is liquified and painted over the paper with a brush, leaving a round disc of the size of half-a-crown in the centre uncovered. When a light is placed on one side of the paper, a dark spot is observed on the uncovered portion. When another light is placed on the other side of the paper, the spot is still distinctly visible if the distance of the light is such that the reflected portion from the paper be either of greater or of less intensity than that transmitted. When the paper is so situated between the two flames that the transmitted and reflected light are of the same intensity, the uncovered spot is no longer visible. The standard usually adopted is a spermaceti candle, of such construction and diameter of wick that 120 grains are consumed per hour. With a light of uniform intensity on the one side, the transmitted light will be of uniform intensity; and with flames of variable intensity on the other, the screen must be moved along the horizontal beam until the disc can no longer be distinguished. The squares of the respective distances of each flame from the disc will then indicate their relative values as illuminating agents. It has been found easier to judge of the condition of the screen by placing a slightly conical blackened cap on each side of it, through an aperture in the side of which the screen can be viewed.—*Ronalds & Richardson's Technology.*

GAS IN ENGLAND.

The London *Builder* of February 14th, contains some interesting information respecting certain English Gas Companies, from which we take the following:

The bad quality, high price, and deficient quantity of the gas supplied by the Maidenhead Gas Company having been much complained of, a meeting of gas consumers has been held on the subject. The meeting was addressed by Mr. T. Atkins, civil and gas engineer, who stated that he had had much experience in lighting upwards of fifty towns with gas, all from 1,000 to 15,000 inhabitants, and had endeavored to make gas works not only paying undertakings, but the medium for promoting rational and civilizing influences, and for dispensing comfort. As for Maidenhead, he regretted to say there was a dereliction of duty and a short-sightedness on the part of the old company. He cited half a dozen towns of a like size to Maidenhead, where he had been called in to erect new gas-works, all of which had ended in the price of gas being reduced, the consumption extended, and the dividends increased, in some cases from almost zero to 8, 9, and 10 per cent. The commercial policy to be pursued in gas-works, he remarked, is to manufacture largely and easily, and supply extensively, and at a cheap rate. The terms required by the consumers were a reduction from 6s. 6d, to 5s. per 1,000 cubic feet. In Chepstow, with a population of only 3,500 persons, he had put up new works, at a cost of £6,000, and had reduced the price of gas from 10s. to 4s. Though both the old and new company still carry on business, both pay a percentage, the new company paying 6 per cent. At Barnet, the rental had been increased from £200 to £1,600 per annum, the old company had been bought up for a large sum, and the price of gas had been reduced from 10s. to 5s. per 1,000 cubic feet. At High Wycombe, the price had been reduced from 15s. to 6s., and the old company's works purchased. In each of these cases a dividend of from 6 to 10 per cent. had been paid. At Dartmouth, with new works at £3,500, the gas was lowered to 5s., £1,200 paid for the old works, and a similar dividend paid. All these were the results of cheap gas and free trade in gas-fittings. Companies stood in their own light by maintaining high prices for gas, and a monopoly of fittings. The nucleus of a Maidenhead consumers' deputation was formed at the meeting.

The Worcester Gas Company have declared a dividend of 10 per cent. for the past half year.

The Chester United Gas-Light Company have also declared a dividend at the rate of 10 per cent.: they have reduced the price of their gas so far by granting 2½ per cent. discount on speedy payment.

A dividend of 8 per cent. has been declared by the Stoke, Fenton, and Longton Gas Company, whose directors congratulate them on the success of their operations, and state that an enlargement of their works has become necessary.

A dividend of 6 per cent. has been declared by the Collingham Gas Company, besides a reserve; and the directors state that the consumption of their gas has considerably increased.

The Crowle Gas and Coke Company have declared a dividend of 10 per cent., leaving a balance on hand.

The Manchester Gas Committee have recommended the following reduced scale of charges in the townships beyond the city on the near side of the Mersey, viz.: When the quarterly consumption is under 500,000 cubic feet, 4s. 3d. per 1,000; 500,000 and under 1,000,000, 4s. 2d.; 1,000,000 and under 1,500,000, 4s. 1d.; 1,500,000 and upwards, 4s. In the district beyond the Mersey, they recommended that the present price, 4s. 6d. per 1,000 cubic feet, should be continued. It was estimated that the reduction would at the present time amount to £800 per annum. The report was adopted.

The Alnwick Gas Company have just declared a dividend of 10 per cent. for the past year, and resolved to reduce the price of gas 6d. per 1,000 cubic feet, making it 5s. per 1,000.

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THE

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PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

MONDAY, MARCH 16, 1863.

A bill is pending before the Legislature of this State to compel gas companies to charge a uniform price for gas sold to ordinary consumers. The obstreperous conduct of the old Brooklyn Gas-Light Company is the cause of its introduction, and consumers in the "City of Churches" are somewhat interested in its passage, those desiring upright dealing and fair play being its strongest advocates.

The ridiculous action of the old Company in reducing the price of gas to a minimum in those streets *only* where the mains of the Citizens' Gas-Light Company are laid, has been often alluded to, and as often reprehended in the columns of this JOURNAL. A more foolish and silly proceeding could hardly be imagined. It is offensive to the common sense of the community, while, to the minds of consumers themselves, who may be temporarily benefitted by the reduction, it is only suggestive of those sudden shifts men are sometimes put to under severe pressure, and which in their cooler, calmer moments, they repudiate with some warmth of expression. Since the inauguration of the opposition company, the wits of the managers of the old concern have been tested in every way to discover some effectual means of putting a damper on the progress of the young and vigorous corporation. As a last resource, the brilliant idea struck them to adopt a sliding scale of prices, and to so adjust their rates as to compel those consumers who are under the necessity of taking gas from them to pay old prices, while putting their charges as low as $1 25 per thousand cubic feet to those who are fortunate enough to have the mains of the Citizens' Company in their street. The old Company had no popularity worth speaking of in their palmy days; and if anything were wanting to cap the climax of absurdity, and to invite the enmity and contempt of the public, they could hardly have hit upon a more decisive measure than they have adopted. A concession in price freely made, and extended alike to all, would have restored the waning credit of the old Company. But offered only upon compulsion, and granted only where stern necessity pointed the way, such an acquiescence with the popular demand assuages no previous enmity, nor converts former enemies into friends. A more suicidal act could hardly have been committed; and the sooner the Solons who manage the affairs of the ancient corporation find this out, the better will be their standing with the public.

As regards the bill now before the Legislature, it was introduced with especial reference to the sliding scale of prices adopted by the old Company, and although its provisions will apply to all gas-light companies throughout the State, we are not aware of any other concerns needing the wholesome restraint upon avarice which this bill imposes. We are informed that the united delegation from Kings county are in favor of the bill, and that there is hardly a doubt of its passage, "notwithstanding," as a Brooklyn daily remarks, "the unanswerable logic which a wealthy Company can always bring to bear at Albany." The friends of the old Company have put forth a document, which smacks of the Artful Dodger in every line. An extract will suffice to show the gist of the argument employed:

"The result is, that an application is pending before the Legislature to do—what does the reader suppose? Why, in substance, to compel the old Company to raise their prices, and thus to destroy the very principle of competition, to institute which the new Company was organized, and from the operation of which our gas consumers have realized so much of profit and advantage. We know not what the title of the proposed bill is, but, in order that it be made to conform to the requirement of the State Constitution, that every law shall distinctly specify, in its title, its object, we would suggest it be styled, 'An Act to prohibit competition in the sale of gas in the city of Brooklyn, and to enable the Citizens' Gas Company to fix the price thereof as they may please.' We concede it would be desirable to have the price of gas throughout the city, ranging at a uniform rate, but can see no necessity for going to the Legislature for any enactment on the subject. All that is necessary to be done is for the Citizens' Gas Company, as they have had permission granted them to do, to lay their mains in all the streets, and thus make the principle of competition general throughout the city."

It would be difficult to crowd a greater number of misrepresentations into a smaller space than the above extract contains. It is false—every word of it. The Legislature is no more asked to "compel the old Company to raise their prices," than to "compel" them to reduce them. All that is asked is that a *uniform* price be charged, whether high or low. The Brooklyn *Daily Eagle* has some apposite remarks on this subject, which we quote:

"Nobody desires that the old Company should 'raise their prices.' We assume that the old Company is not endeavoring to break down its competitor by selling gas at a losing rate. We assume that it can afford to sell gas in Fulton street at the price at present charged, that is, ten shillings per thousand feet. According to the Company's own argument, they can afford to sell it at still less in the streets north of Fulton street, and nearer to the Company's works. Now, what the bill proposes is, that in these and other streets the price shall be the same as it is on Fulton street. Now, if we take the other side of the question, and assume it for granted that the Company is selling gas in Fulton street lower than it can be sold with a fair profit, for the purpose of breaking down opposition, it is surely the interest of the gas consumers of Brooklyn to put an end to a system which can result only in leaving the public once more at the mercy of the old Company, who never found out until the new Company was started that they could sell gas on any of the streets for less than three dollars per thousand feet. If they get the field again to themselves, what guarantee have we that they will not 'squeeze' out of the helpless gas consumers four dollars per thousand feet, that they may make good the amount it cost them to break down the rival Company?

"Granted that the bill is intended as here claimed, to compel the old Company to raise the price of gas, does anybody believe that if the old Company thought so, they would employ one of the most eminent lawyers in the State to frustrate a measure which they allege is designed to put money in their plethoric coffers? What a dear delightful old institution it is that is so tender of the public interest that it will not even suffer the Legislature to 'compel' it to raise the price of the article it manufactures. CASBY, in his most benevolent mood, never talked so tenderly to his tenants, while PANKS was 'squeezing them' by his instructions."

All the arguments and manifestos in the world combined will hardly convince the people of Brooklyn of the equity of the action of the old Company. It is contrary to every principle of fair business dealing and common sense, and we trust that the Legislature will pass the bill before it, which, we have very little reason to doubt, they will do, and that under its beneficent provisions the Brooklyn Gas-Light Company will return to the scale of regular prices—the lower the better—and that they will endeavor, by well-doing in the future, to atone for the wrongs they have put upon some of their best friends. Legislative correction is an expedient not always to be hoped for, but when it is invoked, it generally makes a clean sweep, and in this case we hope it will prove beneficial to all concerned—to the consumers of gas in that city, to the Citizens' Company, and to our quondam friend, the Brooklyn, about the latter of whom we have written these, words more in sorrow than in anger.

MONGRUEL'S NEW LIGHT.

In a recent number of this JOURNAL, while speaking of this "new" light, which has been exciting some attention in England for a few months past we expressed the opinion that it was a mere revival of the old and abandoned idea of gas or air carburation by means of naphtha or some equivalent hydro-carbon. From what we can learn from our English exchanges, the not very excitable people of that country, are just now experiencing a "sensation" in the introduction of the apparatus designed by Mr. MONGRUEL, notwithstanding the fact of the want of novelty characterizing the whole thing. In a late number of the *Chemical News* we find the following account of this new light which confirms us in our first opinion:

"A French gentleman, of the name of MONGRUEL, is about to establish a company for the working of a patent, which at first sight seems to be similar in all its details to one taken out by the late lamented CHARLES MANSFIELD, for burning the vapor of benzole and other light hydro-carbon oils. Since 1847, some thousands of pounds have been expended by different individuals in endeavoring to work MANSFIELD'S patent successfully, but without arriving at any successful result. The plan proposed by MANSFIELD was the carrying of a current of atmospheric air through a vessel containing a mass of sponge, or wicks, saturated with light coal oil. The air thus became impregnated with the vapor of the hydro-carbon, which burnt with a very brilliant light. If we recollect rightly, one of the great obstacles in the proper working of the apparatus, was the continued freezing of the hydro-carbon used, from the intense cold produced by the evaporation; an objection which MANSFIELD proposed to obviate by burning a jet of the vapor underneath the vessel—a plan as dangerous as drying damp gunpowder in the oven. The use, too, of a hydro-carbon of extreme volatility would be attended with great danger to careless people; and the sapient municipal bodies who procured the passage of the Petroleum Bill would be frightened out of their wits at the idea of storing such dangerous material in or near their towns or cities. The journals that have already noticed this apparatus, speak of it as a new invention, being apparently unaware or forgetful of the existence of MANSFIELD'S prior patent."

There can be no question of the danger of this apparatus in the hands of careless people—and this includes nearly all who would have to handle it or use it in any way. As we said before, gas companies need fear no apprehensions on account of it, although, from the extravagant way in which some English journals speak of it, one might think it destined to supersede the use of gas altogether. It will soon die a natural death.

LICENSES FOR GAS COMPANIES.

The officers of gas companies do not seem to be aware of the necessity of taking out a license as manufacturers under the Excise Law. From the inquiries we have received on the subject, it is evident that very few companies have taken steps to comply with the provisions of this law. The following correspondence will show the necessity of an early observance of the enactment, and we know that the managers of companies throughout the

country will at once hasten to fulfill all the requirements which may be expected of them.

Rooms of the AMERICAN GAS-LIGHT JOURNAL,
New York, Feb. 25, 1863.

Hon. GEO. S. BOUTWELL,
Commissioner of Internal Revenue,
Washington, D. C.:

Sir,—Will you have the goodness to inform me whether gas companies are obliged to take out licenses as manufacturers?

Yours, very respectfully,
C. ELTON BUCK, Editor.

OFFICIAL.

TREASURY DEPARTMENT,
Office of Internal Revenue,
Washington, Feb. 27th, 1863.

Sir,—Your letter of February 25th has been received.

In reply I have to say, that the Excise Law requires gas companies to take license as manufacturers.

Very respectfully,
(Signed) GEO. S. BOUTWELL,
Commissioner.

C. ELTON BUCK, Esq.,
New York.

BACK NUMBERS WANTED.

We wish to purchase copies of No. 42 of the AMERICAN GAS-LIGHT JOURNAL for September 16, 1861. If any of our subscribers have extra copies of this number, they will confer a favor by sending them to us, as we wish to complete sets for binding. We will pay fifty cents each for as many of this number as may be sent us.

We are also desirous of having a few more copies of No. 51, date, February 1, 1862, for which we will pay the same price.

The back volumes of this JOURNAL are in greater demand than ever before, and although we thought our editions then printed, amply large for any emergency, the liberality of our friends, whose name is legion, has exceeded our sanguine expectations.

THE LONG ISLAND GAS-LIGHT COMPANIES.

Our sketch of the Long Island Gas-Light Companies will appear in the next number of this JOURNAL. We are having an accurate map of the districts of these companies engraved, to prepare which demands considerable time and labor. Orders for extra copies of the next number should be sent in at once.

ANSWERS TO CORRESPONDENTS.

J. B. S., of Pa.—*Your favor is received with many thanks. We will make the inquiry you suggest, and reply at greater length. Your surmises are undoubtedly correct.*

L. T., of C. W.—*Our correspondent's views are, in the main, correct. We were unable to see any evidences of "ferocity" in his document, although his arguments are of the "hard pounding" style. He has written us another letter which you will see elsewhere.*

B. H. F., of N. Y.—*You will find much information on this point on pages 180 to 183 of our third volume. The testimony of the eminent chemists and gas engineers there reported conveys a great deal of useful intelligence, and covers the whole ground you propose to investigate.*

C. J. E., of Md.—*Gesner's work is a good practical treatise on the subject, and is the latest publication with which we are acquainted. It relates more to petroleums than oils distilled from coal, although both receive due attention.*

THE HIGHEST SPECIMENS OF ENGLISH JOURNALISM.—We are preparing a *resumé* of our editorial intercourse with Bull, as a specimen of the comity and amiability of the representative of the highest of English Journalism. It will present an interesting group of courteous and refined expressions addressed by a so-called *pater-amilias* to his adopted juvenile, who, it must in justice. to the latter be said, has repudiated him from the first It may take a wise child to know his own father; but a very stupid youngster may know from instinct who is *not* his paternal.

CORRESPONDENCE.

COMPARATIVE CHEAPNESS OF PETROLEUM AND COAL GAS.

New York, March 7, 1863.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

In the last issue of your JOURNAL I noticed a short paragraph, copied from the *Journal of the Board of Arts for Upper Canada*, in which I come in for a share of attention from the writer, who informs the public that I have "much to learn respecting the properties of water in certain conditions or states." He further states, that my letter of December 20th, published in your number of January 1st, is worded in "an unusually violent strain," and charges me with making "groundless statements," and writing a "ferocious document." Now, Mr. Editor, I am ever ready to acknowledge my deficiency of knowledge, and most humbly do I plead guilty to the charge that I have "much to learn respecting the properties of water in certain conditions or states." This meek confession should lead the learned editor of the Canadian *Journal* to commiserate my unfortunate condition; and as I really cannot comprehend the *rationale* of his process as he describes it, he should take pains to make it plain to persons of such dull understanding. I trust this gentle hint will be sufficient, and that the writer will give such an explanation of the "spheroidal" theory of the decomposition of water, as will lead disinterested observers to believe the article to have been written for the purpose of affording a plain understanding of an interesting scientific subject, and not with a design of patching up an imperfect process for making gas. I say imperfect—I might use a more positive word, but I content myself with this expression, though it does not convey one-half the meaning which the results of the process in question would seem to justify. As I am willing to make the confession that I have "much to learn" on this point—and here I will even acknowledge that my scanty stock of ideas sadly needs replenishing on other subjects also—I have no more to say on this branch of the subject. But since the publication of my letter, several little facts have come under my notice which go to confirm all the views I then expressed, and even to strengthen the arguments I used, and the evidence I adduced to prove the superiority of coal over petroleum for the purposes of gas-works.

The article upon which my comments were made, gave a highly laudatory description of the [patent petroleum and water-gas process which had just been adopted in Homer and Courtlandt, in this State, and which was said to be an extraordinary success—the quality of the gas being "assumed" to be "three times that of coal-gas," while, in a dollar-and-cent point of view, the new process was pronounced far superior to any known way of making gas—the article closing with the following extremely modest sentence:

"After a perusal of this article, every candid reader will acknowledge that gas from petroleum, manufactured by the process described, is not only the most economical and agreeable mode of illumination which has yet been brought before the public, but, as a cheap source of heat, it may present its claim to the patronage and encouragement of the public, with the best prospects of general adoption."

All this will follow "after a perusal of this article"! Powerful writer! Wielding a pen of such mighty strength, who shall withstand the arguments he presents? After *I* gave the article a "perusal," no such immediate conviction of its truth flashed upon *my* mind; but then I have "much to learn;" and, being in this blissful state of ignorance, of course I could not be expected to acknowledge the truth of the writer's deductions. Perhaps I may be pardoned for saying that after a perusal of this communication, I don't think many "candid readers" will agree with the Canadian *Journal's* views; but this opinion I base upon a statement of facts, and not upon a piece of special pleading, or interested argument—facts which have, doubtless, ere this come to the knowledge of the editor of that *Journal*, but about which he preserves an ominous silence. But to proceed to the consideration of these facts.

At the villages of Homer and Courtlandt, where this much-lauded process was adopted by the gas company, *a very few weeks' experience of its operation induced the Company to abandon it, and to return to making coal-gas.* Would this result have followed if the writer's assertions respecting its superior economy had been true? Most assuredly not. And yet these very villages are the ones which the writer quotes to prove the value of his process, and on the veracity of his statements has staked the reputation of his *Journal*. Can he retract his own statements? or dare he deny that the process which he represented as cheaper than coal-gas in the ratio of nearly three to one, proved a complete failure in these villages? Perhaps he will condescend to explain this point to such of us benighted individuals who have so "much to learn." Since the bursting of the petroleum gas-bubble at Homer, the *Journal of the Board of Arts* has preserved a silence on the subject of petroleum-gas quite at variance with the *penchant* it formerly exhibited for this branch of applied science. Will the editor contradict the fact of the failure of his favorite process at Homer, and place my assertion of it in the category of "groundless statements?" We shall see.

In the AMERICAN GAS-LIGHT JOURNAL of December 15, you printed a very carefully and artfully worded certificate given by the proprietors of the St. Nicholas Hotel, of this city, in favor of a newly patented petroleum gas process which had been introduced into that house. You are probably aware that this was precisely the same as that in use at Homer. Scarcely was the gas turned on the house ere the willing proprietors gave the certificate above alluded to—the composition of which is a curiosity, let me remark in passing. This certificate was also published in the *Journal of the Board of Arts* for December, prefaced with some highly laudatory editorial remarks, which the writer could not have more emphatically expressed had he been personally interested in the proprietorship of the patent. In these remarks it was stated that the annual saving to the St. Nicholas Hotel by the use of this process, "even when crude petroleum is at 50 cents a gallon, amounts to more than $16,000!" This was surely a strong argument in favor of the process; but did the assertion prove true? or was it one of those "groundless statements" which advocates of new processes so often make? What was the result of the the working of this process at the St. Nicholas? The editor of the Canadian *Journal* does not inform his readers of its total failure. For the benefit of those of his patrons who may see this JOURNAL, I would inform them that but a few days after the blatant certificate was obtained, the proprietors of the house were *obliged to stop their works, and turn on Manhattan gas, which they have been using ever since!* Will the editor of the *Journal* deny this, or call it a "groundless statement?" I might bring additional testimony to bear upon this point, by obtaining a new certificate from the then proprietors of the St. Nicholas, "revised and corrected," in which they would express an opinion of the process *slightly* different from that mentioned in the certificate published on page 185 of your JOURNAL.

Another "groundless statement" which I made in my former letter was respecting the quality of light produced by this process. The *Journal of the Board of Arts* proclaimed the petroleum-gas to be four times as rich in illuminating power as coal-gas, but with an affectation of fairness "assumed" it to be "only three times that of coal-gas." While this process was in operation at the St. Nicholas, the dimness of the light was a subject of complaint by many of the guests of the house, while in some of the rooms it was almost impossible to read or write; the small size of the burners required to consume the gas without smoking, and the imperfect manner of making the gas, together forming an effect which would have gratified the admirer of a "dim religious light," but which was rather tantalizing to those who wished to apply it to any useful purpose. Add to this the smokiness of the flame whenever exposed to a current of air, and it will not be difficult to form some conception of the trouble caused to the guests of the house during the continuance of making gas by this process.

I have shown that this advocate of this particular patent of petroleum-gas declared it to be of a marvellous degree of luminosity—at least three times that of coal-gas. In my former letter I showed that coal-gas, such as is burnt in this city, is of at least *sixteen* candle power; so that this highly lauded petroleum-gas must, if the writer's assertion proved true, be of at least

forty-eight (!) candle power. The December number of the *Journal of the Board of Arts* contains a certificate from Dr. Wolcott Gibbs, of this city, who instituted a phometrical examination of the gas made in the St. Nicholas Hotel works. It is unnecessary for me to say anything of the standing of Dr. Gibbs as a chemist. Occupying an enviable position in the scientific world, his opinions are concurred in by all as worthy of the most unbounded confidence. His experiments were made at the laboratory of the Manhattan Gas Company, with apparatus of the most delicate finish, and in his certificate he states this gas to be equal to *twenty-seven and forty-eight-hundredths* candles; or instead of being *three* times as rich as coal-gas, it was superior to it only in the ratio of 172 to 100! Will the editor of the *Journal* call this a "groundless statement?"

In the editorial remarks which preface the certificate of Dr. Gibbs, and of the proprietors of the St. Nicholas, in the same number of the Canadian *Journal*, the writer mentions another trait in this new process which deserves serious attention on account of its exceedingly accommodating nature. It seems that a sort of sliding scale arrangement has been adopted, and that gas can be made of any degree of luminosity, within prudent limits, that may be desired. To use the words of the rustic showman—"you pays your money and you takes your choice." I quote from the article as follows:

"By a process which it is not thought advisable to publish at present, but which has already been put in actual operation in New York, the petroleum-gas can be furnished of any desired illuminating power, from the equivalent of 36 candles downwards. In order to make this statement familiar to the uninitiated in gas illumination, it is necessary to remind the reader that the illuminating power of coal-gas is universally expressed photometrically in standard wax candles."

In the above extract, thirty-six candles is the highest illuminating power claimed. First it was declared to be four times that of coal gas (*i. e., sixty-four* candles); then "assumed" to be three times (*i. e., forty-eight* candles); next it decreased to *thirty-six* candles; lastly, Dr. Gibbs pronounced it to be less than *twenty-seven and a half* candles! It is needless to say that the last only of these assertions can be relied upon. The others must be consigned to the department of "groundless statements."

One other remark in the above extract will be news to most gas engineers. I mean the statement that "the illuminating power of coal-gas is universally expressed in standard *wax* candles." Those who have been accustomed to make their experiments with the universally adopted standard sperm candles, will be disposed to characterize this assertion as a "groundless statement."

But I might go on, and continue to show up the Canadian *Journal's* inconsistencies and contradictions *ad infinitum*. The writer of its articles upon gas seems to possess all the versatile talents of the pieman in Pickwick, who, according to Mr. Weller, could season kittens "for beef-steak, weal, or kidney, 'cordin' to the demand, just as appetites wary." So our writer declares his favorite petroleum gas may be seasoned "by a process which is not thought advisable to publish at present," and be made of sixty-four, forty-eight, thirty-six, and twenty-seven candle power and downwards, "'cordin' to the demand, just as appetites wary." I am very much inclined to think that Mr. Weller's pieman used a process in regulating the seasoning of his productions, "not thought advisable to publish." There are many things which might be included in the same category; and I am of the opinion that the editor's laudatory notices of new gas processes, unless prepared with greater accuracy than those heretofore emanating from his pen, should be folded up and laid away, endorsed—"not thought advisable to publish."

AN ADVOCATE OF COAL-GAS.

GAS IN GERMANY.—At Vienna, the expense of public lighting has been increased to the sum of 291,775 florins, or about $145,885.

KITTANING, PA.—This gas company is reported to us as a bogus concern, no part of it being in existence, but its certificates of stock. Who is responsible for this fraud? We would be very glad to know.

STAGE-LIGHTS OF THEATRES.

Mr. Nelson, the architect of the proprietors of the Drury Lane Theatre, London, made a report at a recent meeting of the owners of that building. In the course of his report, he thus referred to the stage-lights of the theatre:

"The order given last season by the Committee, to have every exposed gas-burner throughout the building protected by a wire guard, has been most satisfactorily carried out. Formerly there were nearly 300 exposed gas-lights; now every one has a wire globe around it, and the additional protection of a cover over the burner where necessary. The usual accidents arising from exposed gas-burners cannot therefore take place, and even cotton or gauze may pass over gas-lights so protected without danger.

"As public attention is at this moment much directed to the subject of accidents by fire, I beg to refer to another precaution that has been adopted by order of the Committee, viz., the introduction of hand-pumps. This simple contrivance consists of a common hand-pump in a bucket of water. These are distributed over the theatre, ready for use at any moment. The late Mr. Braidwood prized them so highly that no engine was allowed to leave its station without one; and numbers of fires have been extinguished by the brigade in using hand pumps alone.

"I cannot conclude my report without mentioning that the order of the Committee, with reference to keeping open every door of public entrance and exit throughout the building during the performance, has been carried out to the fullest extent.

"I beg to add, that it may be of some public advantage to state the comparatively trifling cost of the precautions referred to that the Committee have taken against accident by fire, the principle being applicable not only to theatres, but to every shop, warehouse, stable, and private house.

"The expense of a galvanized wire globe, of the most useful form, is 2s. There is no reasonable limit to its durability; it cannot be broken, and never requires painting.

"The talc covers cost from 6d. to 1s. each, and are as applicable to glass as to wire globes.

"The wire guards and covers are as suitable to candles as to gas-lights.

"The cost of a hand-pump and pail of the best kind, with hose complete, is about 2½ guineas. No building of any description should be without one. It should be placed on the landing of every dwelling-house, and may be used by any maid servant.

"If all exposed lights and open fires were properly guarded, and a hand-pump provided, a large proportion of the accidents by fire would be prevented."

PHILADELPHIA, PA.—The Committee on Water, of the Philadelphia City Councils, met recently for the purpose of opening the bids for supplying the city with iron water pipes and branches, and coal. The contract for pipes and branches was awarded to the Messrs. Trainer & Mercer, of that city, they being the lowest bidders. The following is a statement of the bids made: J. W. & J. F. Starr bid for three-inch pipe, 35 cents per foot; four-inch, 47; six-inch, 85; eight-inch, $1 15; ten-inch, $1 36; twelve-inch, $1 52; branches, $60 per ton. S. Fulton & Co. proposed to furnish the three-inch at 34 cents; four-inch at 50 cents; six-inch at 81 cents; eight-inch at $1 10; ten-inch at $1 29; twelve-inch at $1 44 per foot, and branches at 3 cents per lb. Several other bidders were above these. The successful bid was as follows: Three-inch pipe, 30 cents per foot; four-inch, 46 cents; six-inch, 79 cents; eight-inch, $1 10; ten-inch, $1 25; twelve-inch, $1 40, and branches at $55 per ton. Weaver, Fitler & Co., were awarded the contract for American packing yarn, at 11 cents per lb. Stileman, Ellis & Co. received the contract for special iron castings, at 3 cents per lb., clear of Government tax.

The contract for brass castings was given to Mr. Driesbach, at 28 cents per lb. The contract for lead was 12½ cents per lb. The lowest bid for coal was $4 80 per ton, for the Spring Garden Water Works, and $5 25 for the other works, the ton to be 2240 pounds.

GAS IN VENEZUELA.—The apparatus for lighting the city of Caraccas, Venezuela, has arrived at La Guayra, in the English brig *Prince of Wales*, from New York.

The contract for lighting Caraccas was taken by Mr. Talmadge of New York, and the works will be put into immediate operation.

Caraccas is the capital, and one of the wealthiest and most prosperous cities of Venezuela. It is well and regularly built, well paved, and will now be well lighted, thanks to Yankee enterprise. The houses are built of brick or earth, faced with stucco, and often richly decorated. Population about 100,000, and steadily increasing.

The company was organized in Caraccas by Senores Domingo Ruiz, J. M. Larrazabal, and others. The builder is Mr. Talmadge, of New York, who built the Hunter's Point, N. Y., Newtown, N. Y., and East New York Gas-Works, in connection with the late Mr. Scammon. The Caraccas Gas-Works are expected to commence delivering gas by May 1.

BULL OUT OF HIS ELEMENT.—A correspondent, who appears to have kept a tight watch upon Bull's attacks upon us, and the back-handers he has received in return, suggests that it is singular he should have selected the gas business for his profession, when he is so averse to *retorts*.

PATENTS.

UNITED STATES.

37,621.—Joseph Goodrich, Muscoda, Wisconsin, for a Fishing Lantern:

I claim the arrangement of the adjustable reflector, A, and the shaft, K, when used in connection with the box or frame of a lantern, and constructed and operating substantially as and for the purpose specified and delineated.

Second, I claim the index spring, T T, when used for the purpose of adjusting the reflector, A, substantially as set forth.

37,638.—A. N. Parkhust, Peoria, Illinois, for a Pump:

I claim a pump construced of wood and baked clay having a cast metal flange, D, attached to it as shown, and the part, E, which is formed of the baked clay attached to the wooden part, A, and to the upper section, I, of the piping by the bolts, i n, and the different sections of the piping secured together by means of the clamps, G, as herein set forth.

37,658.—Henry Burt (assignor to himself, C. S. Titsworth and T. W. Lowcree), Newark, N. J., for a Water Meter:

I claim, first, Effecting the movement of the valve by means of two pieces with V-shaped ends and a spring, combined with the piston, to operate substantially as herein described.

Second, Combining the valve with the lever, G, or its equivalent, on which one of the V-shaped ends is formed, or to which it is attached, and which is subject to the direct action of the piston, by means of a lever, E, between which and the said lever, G, or its equivalent, lost mention is provided in order to effect the whole movement of the valve very quickly, substantially as herein described.

37,659.—F. B. DeKeravenan (assignor to J. H. Bailey and G. A. Jones), New York City, for a Mechanical Movement for Lamps:

I claim the general arrangement and combination of the mechanism, herein described, and its use and application for the purposes set forth.

37,670.—Benjamin S. Benson, Baltimore, Md., for Molding and Casting Pipe:

I claim, first, The annular flanged base-plate, D d, employed in the described combination with the annular plate, C, and constituting a seat to guide and hold the lower end of the core, as explained.

Second, The detachable anchor, F f, constructed and applied substantially as described to prevent the deflection of the intermediate portion of the core.

Third, The shield, G, employed in the manner explained, to exclude sand, metallic oxide, or other foreign matter, and permit the entrance of the molten metal.

37,680.—John M. de Bolle, Philadelphia, Pa., for a Valve for Hose Nozzles:

I claim the application to hose pipes of the valve disk, A, the same consisting of the conical or beveled edge, C, the flange, F, and the thin gum elastic ring, E, constructed and arranged in relation to each other as set forth, and operated together by means of the carrier, G, on the lever, D, as and for the purpose specified.

37,690.—Albert N. Henderson, Buffalo, N. Y., for a Lamp:

I claim the combination of the said larger tube around the said wick tube so as to afford the said space, without air holes between them, in connection with the said small holes connecting said space with the interior of the body of the lamp, in the manner and for the purposes set forth.

37,696.—F. C. Krause, New York City, for a Composition for Porous Stone for Filtering and other purposes:

I claim the employment or use of a composition for porous stone made of the ingredients herein specified, and mixed together in about the proportion and substantilly in the manner described.

37,701.—Amos Nudd, Waupun, Wis., for a Lateral Lateral Waste Valve for Pumps:

I claim the combination and arrangement of the rod, sliding-gate and socket with the stock of the pump, when operating in the manner and for the purposes substantially as set forth.

37,709.—John D. Smedley, Chicago, Ill., for an Oil Still:

I claim the use of the large pipe, A, in combination with a small horizontal connecting tube, B, in any way substantially as described, by means of which the fluid in the pipe being kept constantly cool and free from agitation from the still, the quantity of liquid in the still is always correctly indicated.

I also claim the extension of the pipe, A, below the bottom of the still, forming a chamber, a, by means of which the water is separated from the oil, and can be drawn off.

37,715.—S. S. Williams, Pittsburgh, Pa., for a Water Elevator:

I claim the combination and arrangement of the parts, as herein specified and shown, for the purposes as set forth.

37,718.—P. J. Clark (assignor to S. S. Clark), West Meriden, Conn., for a Lantern:

I claim, as an improved article of manufacture, a lantern having its base or lower metallic portions, C, provided with an opening, c, and having a movable band, E, or a section of a band fitted upon the base, which band is also provided with an opening, b, all being arranged in such a manner that, by turning the band, the openings, b c, may be made to register, or be brought in line with each other, or placed out of register or line with each other, for the purposes specified.

37,722.—John S. Loomis and Abel Thompson, Brooklyn, N. Y., assignor to Abel Thompson, aforesaid, for a Bung for Coal-oil Barrel:

I claim the ring, a, retained in the staves, substantially as specified, in combination with the screw thimble, b, and bung, f, for the purposes and as set forth.

1,413.—Allen Walton, Philadelphia, Pa., for an Apparatus for mixing Gases. Patented April 5, 1862:

I claim a chamber or mixing reservoir, C, so arranged as to intercept, for the purpose herein described, the continuity or uniform diameter of a distributing pipe, into which air and gas are introduced in definite quantities, and through which they are directed from a meter or meters to the burner.

37,733.—N. F. Burnham, York, Pa., for a Water Wheel:

I claim the ring, D, provided with the flange, l, and arranged in relation with the opening, h, the scroll and rim, f, of the wheel, to operate as and for the purpose herein set forth.

37,744.—Warren A. Durrin, Milledgeville, Ill., for a Stock Pump:

I claim the combination of the inclined endless apron, A A, and frame, B B, in connection with the governor, D D, and brakes, R and S, and the pitman, F, when applied to operate a pump, as and in the manner delineated and specified.

37,745.—Warren L. Fish, Newark, N. J., for an Apparatus for Cooking with Gas:

I claim, first, The herein-described gas-heating and cooking apparatus, the same consisting essentially in the combination of a cylinder, or its equivalent, closed at the bottom by a perforated plate, and surrounding one or more jets of gas, as shown, with a chimney arranged to operate substantially in the manner and for the purposes set forth.

Second, In combination with the cylinder surrounding the flame or flames, perforated bottom and chimney, I claim the making of the said cylinder of a transparent material, or providing it with one or more windows, substantially in the manner and for the purposes set forth.

Third, I also claim, in combination with the cylinder surrounding one or more flames, and closed at the bottom by a perforated plate, as described, of a heating vessel with a central flue, so shaped as to constitute the chimney to operate substantially as and for the purposes set forth.

37,767.—Charles Perley, New York City, for a Hose Coupling:

I claim a hose coupling having the hinged clasp, c d, fitted with the screw, f, and receiving the flanges, 1 2, in the manner and for the purposes set forth.

37,772.—T T. Prosser, of Fond du Lac, Wis., for a Ventilator:

I claim a ventilator constructed by cutting out suitable orifices in a pane of glass or other transparent substance, and applying thereon a movable disk of a similar transparent material, in the manner substantially as set forth.

37,773.—E. B. Requa, Jersey City, N. J., for a Combination of Globe and Chimney for Lamps:

I claim the combined globe and chimney composed of the oblate spheroidal part, a, and the conical neck, b, so arranged that it may be applied to the burner and have the relative position to the jacket and cone thereof and to the flame, as herein set forth.

I also claim having one side, f, of the part, a, of the globe and chimney ground, and the other side, g, plain or unground, as specified.

A further claim, forming the upper part of the neck, b, of the globe and chimney with a circumferential sunken portion, a', but this I only claim when used with the particular form of globe and chimney, as herein described.

37,781.—Henry C. Turner, Boston, Mass., for a Draught Regulator:

I claim the combination of the register, D, the damper, E, and the division plate or partition, G, operating as set forth, for the purpose described.

37,786.—J. W. Guernsey, Tioga, Pa., assignor to himself and H. A. Guernsey, Wallsborough, Pa., for a Hydrant Valve:

I claim the employment of the double-way cap, E, constructed as set forth, in combination with the perforated disk valve, J, stem, H, and chamber, A, all in the manner herein shown and described.

1,416.—Levi L. Hill, New York City, for Burning Fluid. Patented June 16, 1858:

I claim, first, The use of caoutchousine for imparting greater volatility, as well as greater stability to my compounds. I wish to be distinctly understood as claiming the use of caoutchousine only in combination with the liquids herein described.

Second, I claim, as my invention, the liquids herein described as Nubian oils, A B C D, having the composition and properties set forth, to be used singly or in such relative proportions and admixture as may appear necessary to accomplish the purposes set forth.

Third, I claim passing a current of atmospheric air over or through the described mixtures or their equivalents of hydro-carbons, fluid and more or less volatile or rendered so, by the mixture or by the application of heat and using the mixture of air and the vapors of the hydro-carbon for producing light or heat or both.

1,417.—Levi L. Hill, New York City, for Carbureting Air. Patented Dec. 20, 1859:

I claim, first, Charging air with hydro-carbon vapor by means of an apparatus composed of a vaporizing vessel, bellows or blower, air receiver, induction and eduction pipe, in combination with an independent air-pipe substantially as shown and described.

Second, Combining a current of atmospheric air direct from a bellows or blower, and capable of being regulated as to pressure and quantity, with another current of air that has been passed over or through a more or less volatile hydro-carbon fluid, and utilizing by combustion the mixture of air and hydro-carbon vapors thus formed for generating light or heat or both.

RE-ISSUES.

1,388.—N. O. Hawxhurst, Manhattanville, N. Y., assignor to William Combe, New York City, for a Wooden Sieve for Gas-purifiers. Patented October 21, 1862:

I claim a wooden grating made with apertures between the bars thereof, expanding downward, in lime purifiers of gas-works, constructed substantially as and for the purposes set forth.

1,405.—John Temple, W. H. Mills, and A. L Stout (assignees of said John Temple), Middletown, Ohio, for a Water Wheel, Patented Feb. 8, 1859:

I claim the construction and use of the scroel sluice-gate, B C, applied to operate with a water wheel, in the manner substantially as described

I also claim, in combination with the hinged sluice-gate, B C, the guard, A, as and for the purpose described.

I also claim the levers, K, and ring, J, centrally arranged above the sluice chest, for simultaneously operating a series of gates in combination with the gates, and actuated by mechanism substantially as described.

1,406.—Thurlow Weed, Albany, N. Y., and P. S. Shelton, Boston, Mass., (assignees of A. F. Jaloureau, Paris, France), for a Process of Manufacturing Water-proof Cement Pipes, Patented May 24, 1859. Ante-dated Dec. 30, 1857:

I claim the process of forming pipes or tubes of rolls of paper, or other tissue, and bitumious mastic by drawing or passing the paper, or other tissue, through the liquid mastic, and rolling it up to the required thickness on a mandrel to cause the several windings and the interposed mastic to unite, substantially as described.

And what is finally claimed is the forming of such pipes or tubes on a paper sleeve, or cylindrical tube fitted to the outer surface of the mandrel, substantiallly as described, by means of which the pipes or tubes when made can be readily slipped off from the mandrel, as set forth.

1,407.—Thurlow Weed, Albany, N. Y., and P. S. Shelton, Boston, Mass., (assignees of A. F. Jaloureau, Paris, France,) for Water and Air-proof Pipes from Bituminous Cement, Patented May 24, 1859. Ante-dated Dec 30, 1857:

I claim the new manufacture of pipes or tubes composed of several thicknesses of paper, or other tissue, rolled up and the several thicknesses or windings united by interposed bituminous mastic, substantially as described.

1,408.—Thurlow Weed, Albany, N. Y. and P. S. Shelton, Boston, Mass., (assignees of A. F. Jaloureau, Paris, France,) for a Process of Manufacturing Water-proof Cement Pipes, Patented May 24, 1859. Ante-dated Dec. 30, 1857:

I claim, first, The mandral on which the pipes is formed by winding, in combination with the kettle, or other vessel containing the liquid mastic or cement, and the cylinder on which the mandrel rolls, and which carries the paper, or other tissue, through the liquid mastic or cement and up to the mandrel, substantilly as and for the purpose specified.

Second, The rotating mandrel and cylinder on which it rolls, in combination with the movable sleeve put on the mandrel, substantially as and for the purpose of preventing the pipes, when formed, from adhering to the mandrel.

And, third, The combination of the rotating mandrel, the cylinder on which the mandrel rotate, the kettle or other vessel for containing the liquid mastic or cement, and the guide or equivalent means for guiding the sheet of paper or other tissue, substantially as described.

EXTENSION.

E. B. Horn, Boston, Mass., for a Camphene Lamp. Patented Feb. 6, 1849:

I claim the manner in which I construct the fountain, in order to allow the rays of light proceeding from the wick of the burner to pass downwards through both the internals and external concentric sides, or shells of the fountain, that is to say, I claim an internal translucent side or shell, in combination with an external concentric side or shell, whether the said two concentric translucent sides of the said fountain be connected together by a translucent or opaque bottom.

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OFFICIAL.

THE COMMITTE ON SEWERS OF the Board of Aldermen will meet every WEDNESDAY, at 3 o'clock P. M., in Room No. 8 City Hall. Parties interested in any matter before the Committee will have an opportunity of being heard.

T. FARLEY,
IRA A. ALLEN,
G. A. JEREMIAH,
Committee on Sewers

OFFICE OF THE CITIZENS' GAS-LIGHT COMPANY OF BROOKLYN, No. 1 POST-OFFICE BUILDING, MONTAGUE ST., BROOKLYN, Dec. 29, 1862.—THIRD DIVIDEND.—A dividend of THREE PER CENT. on the capital stock of this Company has been declared, payable on and after the 15th of January. The Transfer Books will be closed from the 1st to the 15th of January inclusive. By order,

H. WARREN, Secretary.

OFFICE WILLIAMSBURGH GAS-Light Company, Brooklyn, N. Y., January 12th, 1863.—DIVIDEND.—The Board of Directors have this day declared a semi-annual DIVIDEND of FIVE PER CENT., payable on and after Monday next, January 19th.

The Transfer books will remain closed until the 20th. C. F. BLODGET, Secretary.

JERSEY CITY WATER LOAN Bonds.—Notice is hereby given that the Interest Coupons, due January 1, 1863, of the Jersey City Water Loan Bonds, will be paid upon presentation at the Ocean Bank, New York city, and the Bank of Jersey City, Jersey City, N. J.

G. S. BOICE, Registrar.
OFFICE OF THE WATER COMMISSIONERS, Jersey City, Dec. 29, 1862.

A CIVIL ENGINEER, FOR TWO years engaged in a first class Gas-Works, is desirous of obtaining charge of some country works. Salary not the object. Reference given. Address GAS ENGINEER, Post Office, Bordentown, N. J.

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A Treatise on Gas-Works and the Practice of Manufacturing and Distributing Coal-Gas. By Samuel Hughes, Civil Engineer.

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The Chemistry of Gas-Lighting. By Lewis Thompson, Consulting Chemist.

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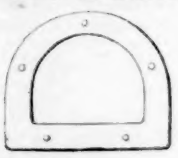

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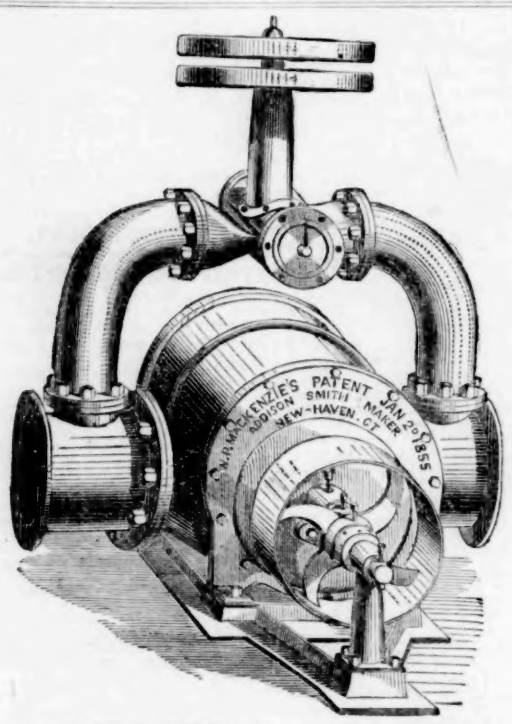

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Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

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Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent-hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air-bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stirring it as it cools until it becomes nearly as liquid as water; then pour quickly.

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These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use there will be less likelihood of mistakes, and consequent collision, than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels consists in having the Lanterns containing the colored lights connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side-wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle-wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof. In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle-wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the Lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ship [illegible] time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red,	Represents	Number	1.	Two Green,	Represents	Number	2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign ○ colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○,	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.
	○. ○.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○.	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○, ○, ○, ○, ○.	
	○, ○.
	○, ○, ○, ○, ○, ○, ○, ○.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

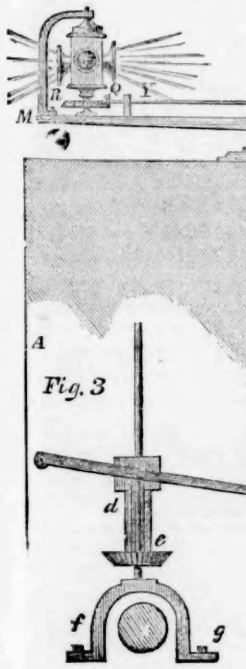
RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○.	
	○, ○, ○, ○, ○, ○.
	○.
○, ○, ○.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2



(GREEN LIGHT)

Fig. 1

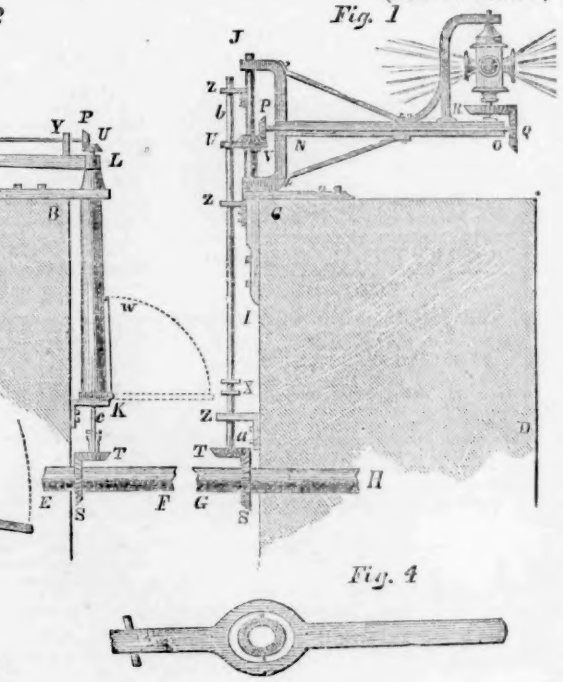


Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel house, but in this device, the rod c U. does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

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N. B.—All persons are warned against purchasing these selves of others who falsely pretend to have patents for them. Suits will be commenced immediately against all persons infringing my patents by using or making wooden sleves, but those who hereafter purchase from me can buy their selves cheap and will not be troubled by me on account of former purchases. R. G. H.

PATENT
Conically Slotted Solid Wood Sieves
FOR GAS PURIFIERS.

CAUTION
TO
GAS MANUFACTURERS.

The Conically Slotted Solid Wood Tray was patented 21st October, 1862, by N. O. Hawxhurst, assignee of Wm. Combe, and all persons are cautioned against purchasing such trays of R. G. Hunt, or any other person except the subscriber, as it is a direct infringment of said patent. The following companies are now using my trays.

Manhattan, New York,
Williamsburgh,
Brooklyn,
Albany,
Baltimore,
Philadelphia,
Chicago,
Louisville,
And numerous others.

Orders received by mail or otherwise.

JOHN L. CHEESMAN,
147 Ave. C, New York City.